

The Mining Journal

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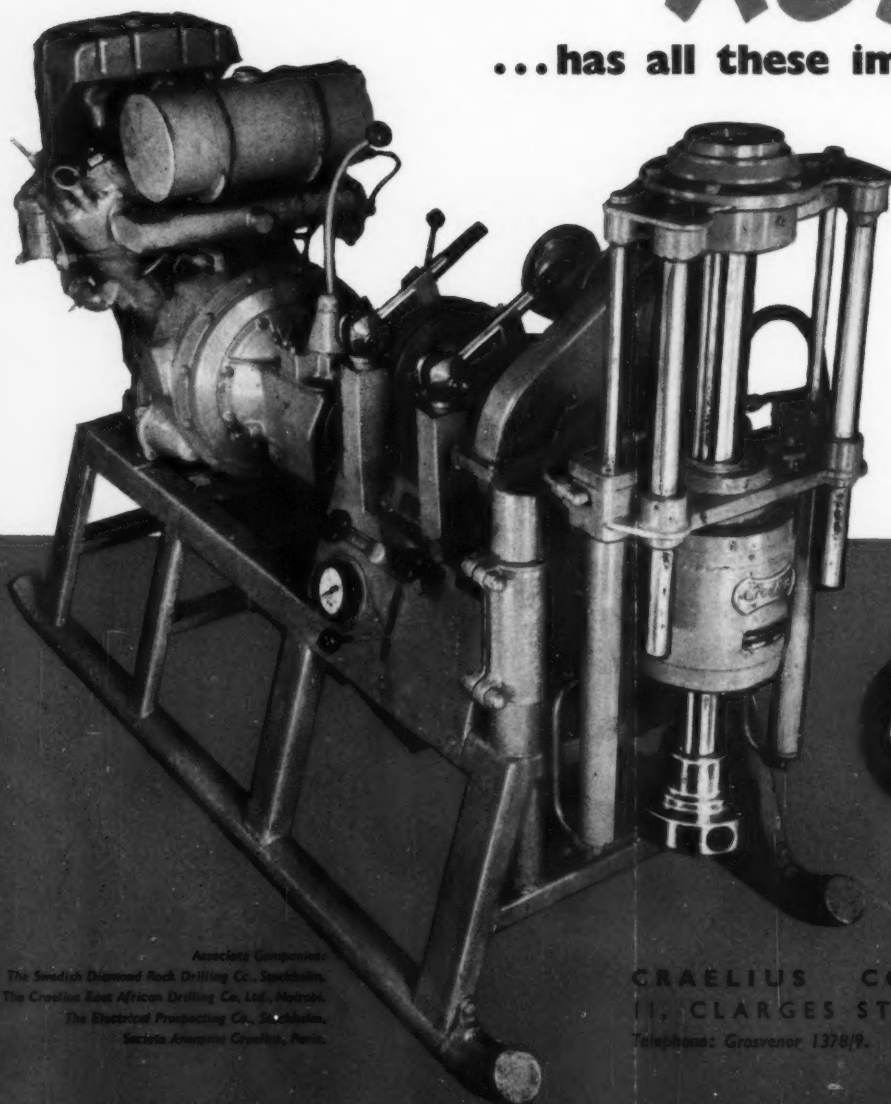
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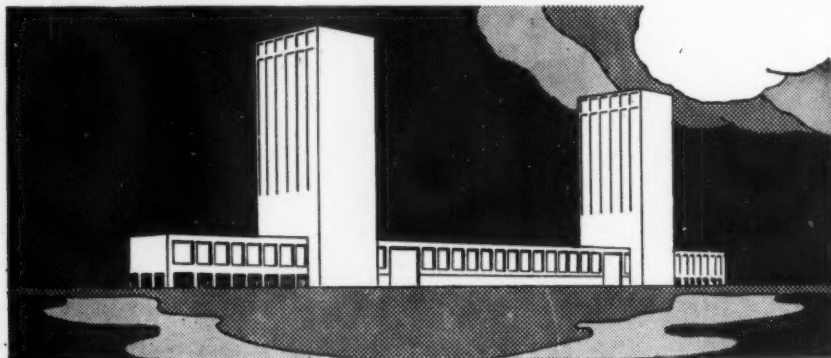
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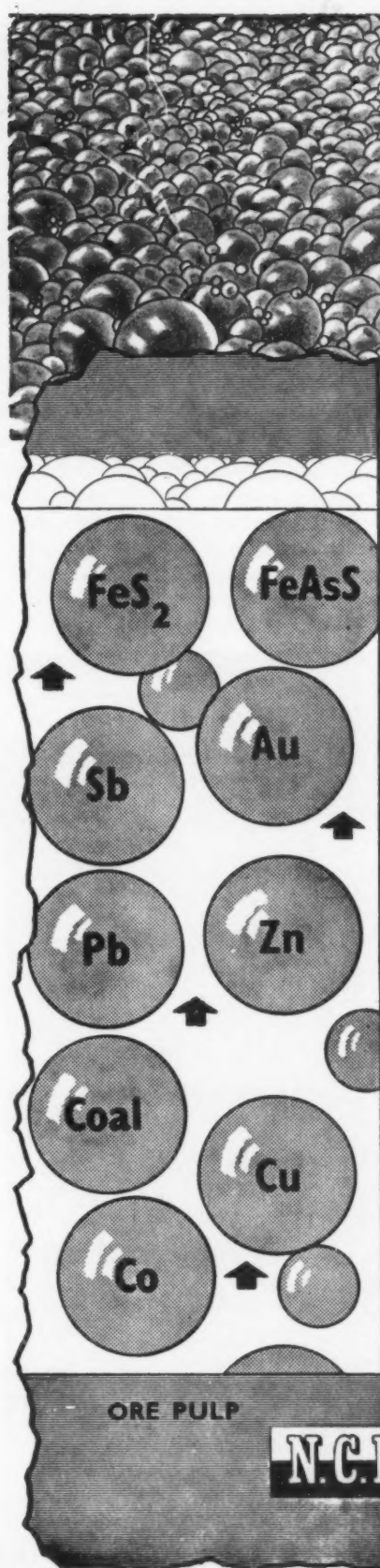
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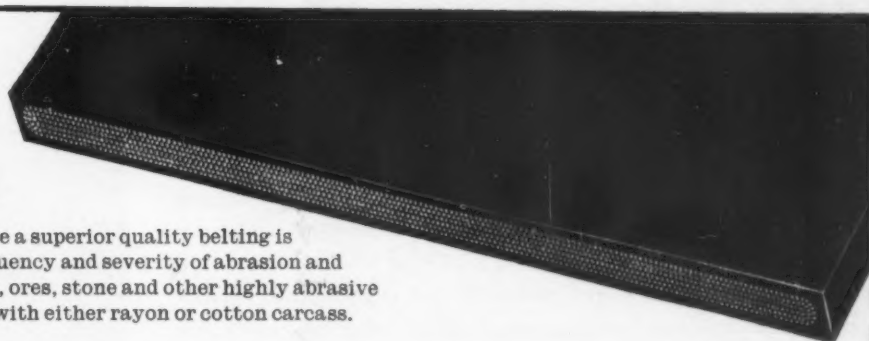
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Aerial view of the Kalgoorlie Golden Mile Field, Western Australia

Kalgoorlie fights rising costs

THE Kalgoorlie goldfield in Western Australia has produced 30,000,000 ounces of gold since 1893. It still produces 500,000 ounces yearly, but post-war rises in wages and prices almost put the cost of mining it right up to the market price for gold. To restore the economics of the operation, new techniques were adopted—one of the most important was the introduction, throughout Kalgoorlie's Golden Mile, of integral drill steels tipped with tungsten carbide, and light pusher leg mounted jackhammers.

In 1950, Atlas Copco light rock drills with pusher legs and Sandvik Coromant drill steels were introduced on the Golden Mile. Soon all mines on the field had converted to the economical new system of drilling, in which Atlas Copco played a major role. The result was an overall increase of 75% in feet drilled per machine shift and 55% increase in ore broken in stopes per machine shift.

Still more efficient Atlas Copco rock drills and more versatile Sandvik Coromant drill steels are being made available to reduce production costs still further on the Golden Mile.

Atlas Copco compressed air equipment is manufactured or sold and serviced in 90 countries throughout the world. For further details contact your local Atlas Copco Company or Agent, or write to Atlas Copco AB, Stockholm 1, Sweden.



An Atlas Copco rock drill operating in a confined space at the gold mines of Kalgoorlie.

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The Mining Journal

London, March 28, 1958

In this issue . . .

Marginal Comment	347
India's Uranium and Thorium Reserves	348
Control of Precious Stones in Southern Rhodesia	348
Canadian Geological Survey Programmes	348
The Value of Aerial Surveys	349
Australia's Uranium Producers	349
Drop in U.S. Coal Exports	349
Conveying Around The World	350
Canadian Occurrences of Columbium and Tantalum Minerals	352
Plastics for Mine Lighting	353
Coal Mining Developments in Britain	354
Mining Miscellany	355
Machinery and Equipment	357
Metals and Minerals	359
London Metal and Ore Prices	359
Mining Finance	361
The Seventh Electrical Engineers (A.S.E.E.) Exhibition	364

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Marginal Comment

AT a time when apprehension is growing lest the U.S. recession cast its shadow over the rest of the Free World, the South African gold mining industry is thriving. It is, of course, past history that gold production last year both by volume and value was at record levels and all signs point to the 1958 figures being even better. This is not to say that the industry has solved all its problems. Far from it. But the two traditional bugbears—costs and labour—are being whittled down to more manageable proportions.

In general terms the improved cost position arises from the better supply of labour and from a more efficient employment of the labour supply. In other years, the inability of the gold mining industry to compete against secondary industry in the labour market invariably placed an upper limit on the scope and extent of the industry's operations. Now, however, the slowing down of industrial expansion during the past year in certain sectors of the Union's economy has reduced the demand for labour by other industries as well as bringing about some measure of retrenchment. The easier labour situation thus created has been assisted by the cessation of operations at one or two old mines and by the contraction of operations at others. Moreover, the sharply changed demand schedules for copper and platinum which led to the virtual suspension of operations at Bancroft and to a much reduced scale of operations at Rustenburg Platinum, have also helped to swell the available labour supply.

Even more important, perhaps, is that the improved labour supply includes a goodly proportion of artisans. It was the shortage of this type of labour in the past that prevented full advantage being taken of mechanization and mechanical devices because of maintenance troubles. In fact, it can be said that for the first time for many years there is no shortage of miners, and mine managers are now in the somewhat novel position of being able to be slightly selective in their intake of labour.

In the longer run, however, the overall position is still difficult as the intake of the Government Miners' Training Schools from immigrants and from indigenous sources is well below estimated future requirements.

What may well prove to be of more importance to the industry than the actual quantitative improvement in labour is the growing adoption in the industry of cost control procedures. In the past year, for example, several mines have employed consultants to work out costing systems and the results therefrom have been most significant, particularly in the case of the marginal mines.

How the system works is shown by a highly simplified example from Rand Leases. Stope "A" gives a net contribution of £2,332 a month and needs 23 Africans to work it. The net contribution per African shift is thus £3 9s. Stope "B" contributes £1,591 using 12 Africans, giving an African shift figure of £5 1s.

When native labour is plentiful both stopes can be worked. But in times of shortage, it is more profitable to cease work at Stope "A" and maintain labour strength in Stope "B". It is thus possible from this costing information to determine the optimum of

deployment of labour in not only stoping itself, but also in stoping reclamation and sweeping.

With regard to the marginal mines, it can be said that while their position is somewhat better than a year ago, it is still not good. Admittedly, the prospects for a higher gold price are brighter, but margins of profit are still too thin—16 out of the 54 producers belonging to the Chamber of Mines operating on a profit of less than 5s. per ton milled.

The joint committee on the future of these mines has reported to the government, but so far no official statement has been made. Unofficially, however, it is believed that the main points the committee advocated were a concession in rail transport rates, a reduction in the labour force and the non-placement of learners. Whether the committee urged the assumption by the State of the terminal silicosis liability is also unanswered, but if this should be so it would be a major boon to old mines.

INDIA'S URANIUM AND THORIUM RESERVES

A systematic and detailed survey, including prospecting, designed to estimate India's reserves of atomic minerals, has been carried out by the Atomic Minerals Division of the Indian Department of Atomic Energy since 1950. The country's total reserves of uranium and thorium are at present estimated at approximately 30,000 tons of uranium and about 500,000 tons of thorium. Roughly half of these reserves are found in the large deposits recently discovered in Bihar.

Since 1949, two new uranium fields have been discovered, and estimates of India's thorium reserves have been doubled. These reserves have been found in a belt 60 miles long in Singhbhum and in Central Rajasthan, and are in addition to the deposits existing in the country's monazite sands. The monazite sands are a third source of supply, existing as extensive ilmenite beach deposits on both the Malabar and Coromandel coasts. The ilmenite sands contain from 15 to 35 per cent monazite.

The placer monazite finds in the soil caps of the Bihar plateau have doubled estimates of India's thorium reserves. From data so far available, the Department of Atomic Energy considers that 250,000 tons to 300,000 tons of thorium oxide may be considered as a conservative estimate of potential yield.

Zircon constitutes about 6 per cent of the ilmenite sands of the Indian coasts, and the country's beryl deposits are said to be of good grade.

Further rich deposits of atomic minerals have been discovered on the Ranchi plateau, and there are indications that other deposits may soon be discovered in this area. Atomic energy is the cheapest form of power for which India can hope, as the coal, oil and hydel reserves of the country are poor in grade and of limited extent. India has about 40,000,000,000 tons of coal, a *per capita* reserve only 5 per cent that of China and 3 per cent that of the United States. Of the 1,300,000,000 kW. of energy consumed in India every year, 1,000,000,000 kW. is derived from agricultural waste, 239,000,000 kW. from coal and only a fraction from hydel, oil and other sources. Nearly 80 per cent of this fuel could be diverted to agricultural usage, were atomic energy available.

The development of atomic energy in India, still in its infancy, will take a long time unless more allocations are made for the purpose. This programme for nuclear development has been so phased that it is independent of extraneous assistance. A plant was set up at Alwaye in 1950 to treat monazite from Cochin and to transport the cake to Trombay where thorium nitrate was used in-

dustrially for gas plant and was also exported. A further plant is to be installed in six months.

CONTROL OF PRECIOUS STONES IN SOUTHERN RHODESIA

Following the discovery of emeralds in the Belingwe District some months ago, new legislation to control the mining, possession and disposal of precious stones in Southern Rhodesia has become essential to reassure the trade in these stones that full control will be maintained as and when it is necessary. This point was brought out by Sir George Davenport, Minister of Mines, Lands and Surveys, during the second reading debate on the Mines and Minerals Amendment Bill in the Provincial Parliament on March 11. The Bill provides, amongst other things, for the establishment of a Precious Stones Board to control and regulate the sale and disposal of precious stones found in Southern Rhodesia.

Sir George said that the Precious Stones Board would be composed of government officials who would have the duty of watching over the emerald market, of fixing the monthly marketing quota of precious stones and the quota to be produced by miners, and to act as agent for the handling, export and safe keeping of the stones. The Board would pay the miners after sale of the product on the emerald market and after deductions had been made for expenses as well as for the royalties due to the consolidated revenue fund.

The speaker added that much of the current legislation appertaining to diamonds could with advantage have been adapted to all precious stones. Yet it had been found necessary to draft a considerable amount of fresh legislation to safeguard the market and the country from the activities of the wrong type of miner. Under the Bill the prospector still enjoyed the right to peg in the ordinary way, but no person would be allowed to mine precious stones unless a special licence had been obtained. To be granted this licence, the prospective miner would be required to produce evidence of good character and proof that his security arrangements were in good order.

CANADIAN GEOLOGICAL SURVEY PROGRAMMES

Much has been done towards the topographical and geological mapping of the Northwest Territories, but because of its vast size, its inaccessibility, and the shortness of field seasons, a great deal remains to be done.

Accordingly, the Canadian Geological Survey has turned to helicopter-supported parties. By this method, 30 times greater coverage has been achieved during any one season.

In the field seasons 1952, 1954 and 1955, the Survey mapped a total of 185,000 sq. miles of the Precambrian in the mainland portion of the Territories on a scale of one inch to eight miles and the experience gained in these operations has enabled the Survey to cut costs and to actually map large areas by helicopter at less cost than by conventional ground methods.

Last year in Operation Mackenzie, the Survey mapped 100,000 sq. miles of the Upper Mackenzie River drainage basin, much of which is being explored for oil and gas. The region is underlain by rocks similar to those in which producing wells have been found in Alberta and to the north-west at Norman Wells, and there is little doubt that this whole area contains a great reserve of oil to which Canada will turn in future years.

This year the Survey will use helicopters to map the geology of the Wholdaia area in south-eastern Mackenzie District, large sections of which are inaccessible to canoes. This year, too, it will also establish fuel caches for two ambitious projects it has scheduled for 1959, Operation Coppermine, and the aerial reconnaissance of Banks and Victoria Islands.

In Operation Coppermine, the Geological Survey will map some 60,000 sq. miles of territory in northern Mackenzie District starting at the western boundary of the Shield and proceeding eastward towards Bathurst Inlet. In the Banks-Victoria Islands project, the Survey expects to explore the main stratigraphical and structural features of some 125,000 sq. miles of the Islands which are still unexplored geologically.

Together these projects are providing the data for an assessment of the mineral potential of the Canadian Northland. They are also providing a veritable storehouse of valuable information to which industry and those interested in resources development may turn in years to come.

In the Arctic Islands, the Department of Mines and Technical Surveys is getting under way this coming field season a \$6,000,000 project to photograph the Islands for later detailed topographical mapping. The project is the largest of its kind ever undertaken in the Free World, and it will take a dozen planes six years to photograph the 500,000 sq.-mile area.

THE VALUE OF AERIAL SURVEYS

The impressive record of prospecting achievement that has been a feature of post-war mining development, has been almost entirely due to the marked advances in technique and concept made in aerial geophysical survey practice. This view was expressed recently in New York by Mr. D. M. Davidson, vice-president of the E. J. Longyear Co., addressing the national convention of the Mining and Exploration Division of the Society of Mining Engineers, a constituent body of the American Institute of Mining, Metallurgical and Petroleum Engineers. Mr. Davidson reminded the gathering that the aerial photograph was now an integral part of geological exploration and added that electromagnetic, magnetic and radiation surveys from the air had led to discoveries accounting for hundreds of millions of dollars' worth of new mineral reserves during the last decade.

The advent of aerial techniques was a happy augury, for the increased cost of labour, supervision and materials, together with the fact that no impressive progress had been made in ground-breaking methods combined to double the cost of underground exploration over the corresponding capital outlay of ten years ago. Only diamond core drilling had not increased in price during this period, owing to various improvements in methods and machines.

Yet aerial photography and photogeology, covering ground in a fraction of the time hitherto necessary, were still not completely efficient without ground survey. "Ground surveys are still vital to the appraisal of any new area", he said. "This type of survey must be fitted in with the others to derive the maximum benefit from all elements in the appraisal".

He went on to describe that aerial magnetometer work for petroleum exploration costs from \$6 to \$9 per line mile. In the case of mineral exploration, where the flight lines are shorter, the average cost is between \$8 and \$12 per line mile. The costs of electromagnetic surveys vary from \$10 to \$17 per mile.

The cost of a complete survey, including magnetometer

readings, electromagnetic work and scintillation counters all combined in one traverse in one fixed wing aircraft survey, vary from \$14 to \$25 per line mile. Helicopter surveys, at \$12 to \$25 per line mile for an electromagnetic survey, are more expensive.

In conclusion, Mr. Davidson said it should be borne in mind that in most cases a ground survey would be required to sharpen the anomalies detected by aerial work.

AUSTRALIA'S URANIUM PRODUCERS

Two Australian mines are already producing uranium oxide, namely Rum Jungle, in the Northern Territory, owned by the Commonwealth Government and worked by a subsidiary of Zinc Corporation Ltd., and Radium Hill, South Australia, a South Australian Government enterprise. In Queensland, the large Mary Kathleen plant, costing in the vicinity of £A10,000,000, is expected to be producing by the end of the year.

The latest to enter the field will be United Uranium N.L., in the Northern Territory, which expects to commence the production of uranium oxide about the same time. The plant will be a converted gold mining company's mill, near Pine Creek, and ore will be mined at the El Sharana deposit. Mining and transport arrangements are being made to move 20,000 tons of ore to the treatment plant during the coming dry season, of approximately nine months.

The mine has been inspected by representatives of the U.K. Atomic Energy Authority to assess the ore reserves, and the company expects to finalize negotiations for a long-term sale contract for uranium oxide shortly. Solvent extraction tests are reported to have been very satisfactory, and recovery is up to expectations. The company is stated to have produced 224,396 lb. of uranium oxide in pitchblende ore since operations were commenced in 1956.

Apart from productive operations, prospecting for uranium occurrences has waned; there is exploratory work in progress in the Mount Isa country, from which some interesting results have been reported, and the Bureau of Mineral Resources is about to carry out aerial work in north-eastern Tasmania.

DROP IN U.S. COAL EXPORTS

Estimates of U.S. exports of coal to Europe in the first six months of 1958, based on reported import requirements furnished by delegates to the O.E.E.C., show a decline of 5,500,000 tons compared to the tonnage shipped in the January-June period last year. This represents a drop of some 25 per cent. Member countries of the European Coal and Steel Community continue to take the bulk of European imports of U.S. coal and are expected to purchase well over 80 per cent of the tonnage shipped.

The U.K. has cut imports of U.S. coal down to an insignificant 50,000 tons of large coal, for in common with most European producers, Britain has inordinately high undistributed stocks. So high have these stocks risen—8,000,000 tons—that there have been calls from miners' leaders and others that now is the time to cut back opencast production currently running at 13,000,000 tons per year. Although strip mining may not appeal to those having draglines at the bottom of the garden, opencasting is undeniably a very profitable enterprise in Britain.

In 1957 the N.C.B. earned £8,000,000 profit on opencast mining. It is significant that both the U.S. and the U.S.S.R. with the largest coal resources in the world still produce large tonnages by opencasting—120,000,000 and 70,000,000 respectively.

INLAND from the northern coast of South America, on the Surinam and Cottica Rivers of Surinam, lie extensive deposits of bauxite. Mindful of the tremendous demands for aluminium which would result from the spreading war in Europe, the Aluminium Co. of America, through its subsidiary, Surinaamsche Bauxite Maatschappij, began an intensive development of these deposits in the early 1940's. With conveying equipment engineered and manufactured by Stephens-Adamson Manufacturing Co., a large ore processing plant was put in operation in 1941 on the Surinam River below Paramaribo.

An Amsco feeder carries the ore from the hopper to a 54-in. belt conveyor running 189 ft. to the crusher building. Since maximum lump size runs up to 30 in., the main conveyor belt is protected at the loading point by a 10-ft. pad belt. This 7-ply belt runs between 10-ft. centres on special Sacon pneumatic impact idlers.

At the crusher building, ore is washed and crushed before being discharged to a 30-in. belt conveyor running 243 ft. to the feed end of the kiln building. After travelling 175 ft. in the kilns, ore is discharged to a 36-in. pan conveyor feeding a 24-in. storage belt. The storage conveyor runs 162 ft. on an incline to the storage building, where ore is discharged by a travelling tripper along a 365-ft. horizontal run. Recovery is accomplished by two 42-in. belt conveyors running in tunnels under the storage pile.

The two reclaiming conveyors discharge to a 42-in. belt running over 400 ft. to a sampling station at the river dock. Capacity of the reclaiming system is over 1,100 tons per hr. at conveyor belt speeds of 400 f.p.m.

The magnitude of reopening the Premier Diamond Mine at Cullinan, Transvaal, and the technical difficulties involved, are readily apparent when it is realized that 15,000,000 lb. of diamond-bearing blue ground must be processed to recover 1 lb. of diamonds. Since the plant began operating in February, 1950, over 6,000,000 tons of ore have been handled.

Ore is carried through crushing and screening operations, and tailings disposed, by belt conveyors totalling over 5,000 ft. in length. These conveyors were designed by Fraser and Chalmers (S.A.) Ltd., and are equipped with over 2,000 Stephens-Adamson Simplex belt conveyor carriers and return rolls. Inclined conveyors are equipped with heavy-duty roller-type holdbacks.

The tailings disposal system consists of nine 36-in. belt conveyors, three of which handle 600 tons per hr. at a belt speed of 310 f.p.m. Material is carried from the plant to



a junction point 2,130 ft. away. Here the load is split and two separate conveyor systems carry material to identical 36-ft. shuttle conveyors. S.A. Swiveloaders, mounted on the ends of the shuttles, throw tailings a distance of 50-60 ft. by means of a high-speed belt moving at 2,400 f.p.m.

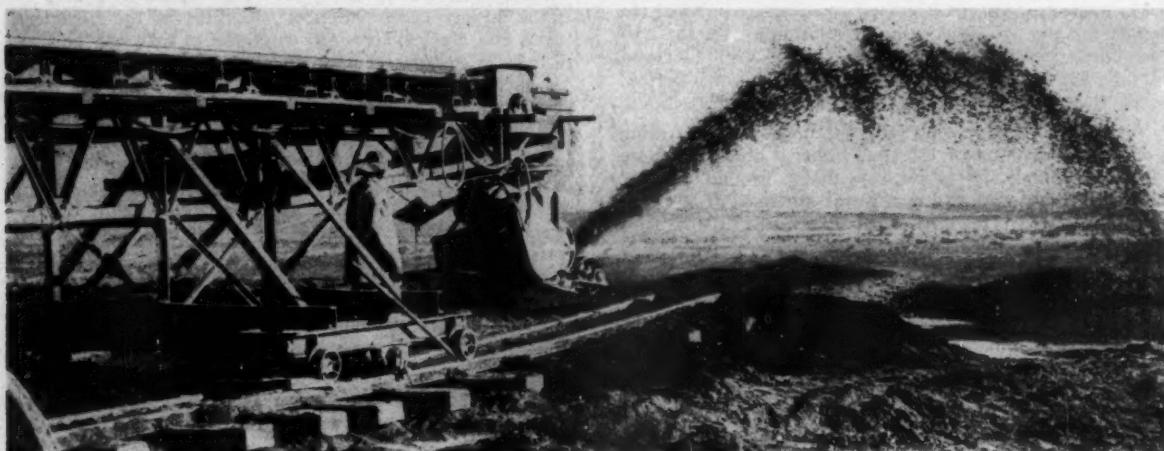
Over 2,500 S-A "Mammoth" and style "444" belt conveyor carriers are in operation at a large South American copper mine. The original conveyor installations, totalling 18,485 ft., are almost twenty-five years old and all carriers

Conveying

have graduated to the "multi-million" ton classification. Six Amsco feeders are also in operation at this plant, handling run-of-mine and primary crushed ore.

The 60-in. belt conveyor shown is equipped with S-A style "444" carriers and in a record period of eleven years, ending in 1950, handled 91,000,000 tons of ore. This conveyor is 1,412 ft. long and handles over 4,800 tons per hr. at a belt speed of 600 f.p.m. The belt is discharged by a

Swiveloaders at the Premier Diamond Mine, South Africa, throw tailings a distance of 50 to 60 ft. by means of a high-speed belt moving at 2,400 r.p.m.





travelling tripper and has a total lift of 20 ft.

Four thousand feet above sea level and 2,000 ft. above the Salmo Valley in British Columbia, lies a sandwich of lead-zinc and tungsten ores. It is here that the Canadian Exploration Co., Ltd., located its Emerald Mine.

It soon became apparent that the aerial tramway, with a capacity of only 800 tons per 24-hr. day, could not supply the demands of the lead-zinc mill. Subsequently, the decision was made to install a \$1,500,000 conveyor system.



At left, Surinam mine ore is fed on a 54-in. belt conveyor at a rate of 210 tons per hr. Centre, a 60-in. belt conveyor with S-A "444" carriers in operation at a South American copper mine. Right, the second conveyor in the Salmo, British Columbia, lead-zinc and tungsten ore system

huge storage silos. 100 ft. high and 80 ft. dia., these silos have a capacity of 10,000 tons each. All belt conveyors are equipped with S-A Simplex belt conveyor carriers with

Around the World

This plan included an underground crushing and screening plant designed to handle both lead-zinc and tungsten ores.

Ore is discharged from twin ore pockets to an S-A Amsco manganese steel feeder via air-operated gates. The Amsco delivers 300 tons per hr. to a jaw crusher which discharges to a belt conveyor running to a double-deck vibrating screen. The 30-in. belt handles minus 4-in. ore and is equipped with a magnetic head pulley to remove tramp metal.

Sized ore moves to a junction point via two 24-in. belt conveyors with a total horizontal travel of 1,430 ft. At a speed of 300 f.p.m. the belts move 300 tons of ore per hr. At the junction point tungsten ore is diverted to a slope belt running to storage bins at the tungsten mill 205 ft. away. Lead-zinc ore falls to an ore storage pocket from which it is fed to a 24-in. underground belt conveyor by rotary drum feeders. Emerging from its tunnel, this conveyor feeds a surface belt running to another ore pocket. Together, these conveyors move a total of 3,454 ft. horizontally.

Ore falls 342 ft. in the second pocket to an underground slope belt. After two more drops and two belt conveyors, the ore is delivered to the lead-zinc mill for processing. The 24-in. belt conveyor system handles 150 tons per hr. at a belt speed of 300 f.p.m. All conveyors are equipped with Simplex-type carriers with 5-in. rolls.

Modern port facilities in Jamaica, designed and furnished by Stephens-Adamson Manufacturing Co. of Canada, Ltd., are capable of loading out alumina in bulk at a 660-ton per hr. rate. Discharged to an enclosed track hopper, alumina moves via a 30-in. belt conveyor to two

labyrinth-sealed roller bearings. The non-contact, non-corrosive seals that are installed ensure long bearing life.

Sixteen miles up the Coatzacoalcas and Cochara Rivers from Minatitlan, Veracruz, Mexico, on a 1,482-acre jungle clearing called San Cristobal, the Mexican Gulf Sulphur Co. began production in March, 1954, after an investment of more than \$6,000,000.

Sulphur is delivered to a Stephens-Adamson conveyor system by a power shovel which loads a travelling hopper designed with a crusher which reduces lumps to 6-in. size.

The hopper traverses two long belt conveyors running between the storage blocks. Both 36-in. belts feed the sulphur to a slope belt running to a loading tower at dockside. One of the feeder belts is 325 ft. long and the other 224 ft. long. Normal belt capacity is 400 tonnes per hr. at a speed of 350 f.p.m.

A contract for approximately \$1,000,000 worth of engineering and conveying machinery has been awarded by the Venezuelan Ministry of Public Works to Stephens-Adamson. The Venezuelan project will consist of a conveying system to handle coal and limestone at the port of Guanta. It will include ship-loading facilities and will load in and out of storage. New and novel coal-handling techniques will be employed. The system will be rated at 2,000 tonnes of material per hr. and will make Guanta one of the world's largest coal-handling ports.

Many Stephens-Adamson conveyor installations are concerned with iron ore handling. These installations are sited in widely scattered parts of the world, namely Bukit Besi, Malaya; San Juan Bay, Peru; Samar Island, Philippines; and Seven Islands, Quebec, Canada.

COLUMBIUM AND TANTALUM—II

Canadian Occurrences of Columbium and Tantalum Minerals

PRODUCTION of columbium and tantalum minerals in Canada has so far been confined to a very small output following the end of World War II and in the years 1954 and 1955 from the Yellowknife area of the Northwest Territories. The operations did not succeed, the known deposits being, in general, too low-grade to be profitable at present.

The property of the Quebec Metallurgical Industries Ltd. at Bugaboo Creek, British Columbia, has post-glacial gravels containing uranian pyrochlore derived from erosion of the Bugaboo granite stocks. Concentrates have been shipped to the company's research laboratories near Ottawa and are now being processed to produce high-purity columbium oxide, columbium alloys and columbium sponge. Proved and potential columbium-bearing gravel reserves amount to 65,000,000 cu. yds. Concentration tests show that 0.11 lb. of columbium per cu. yd. of gravel can be recovered in a black sand concentrate, indicating a recoverable potential of 3,575 s.tons of columbium.

In the Sudbury district of Ontario, Multi-Minerals Ltd. own a property seven miles from Numegos Station on the main line of the Canadian Pacific Railway, about 14 miles from Chapleau. Here, two major deposits outlined by diamond drilling contain 50,000,000 tons of material with an average of columbium pentoxide content of 0.26 per cent and with local concentrations of undetermined extent assaying more than 1 per cent Cb_2O_5 . Included in this tonnage is a 2,000,000-ton calcitic body of a type similar to that at Sove, Norway. Mining and processing of the columbium deposits are contingent on the operation of adjacent magnetite-apatite deposits and on market conditions.

Also in the Sudbury mining district, Dominion Gulf Co. have outlined two areas of columbium mineralization on their property at Numegosenda Lake, 17 miles north-east of Chapleau. Extensive diamond drilling on one area has indicated over 20,000,000 tons of material averaging 0.5 per cent columbium pentoxide. In addition, there is a substantial tonnage averaging down to 0.3 per cent Cb_2O_5 . The columbium mineral is pyrochlore. The other area has been drilled only sufficiently to identify the presence of ore zones. From this drilling a possible tonnage of 30,000 tons per vertical ft., or 15,000,000 tons above the 500 ft. level, has been indicated. Field work has been terminated and the company is working on an extraction process.

Beaucage Mines Ltd. own a property in the Nipissing Mining district where over 5,000,000 tons of pyrochlore have been indicated. Values range from 0.042 to 0.075 per cent for uranium oxide and from 0.69 to 1.06 per cent for columbium pentoxide.

A 50-ton test mill has been erected and is being operated at Yellek on the shore of Lake Nipissing to check the laboratory findings of Battelle Memorial Institute. This process consists of three basic steps: flotation to eliminate pyrite and calcite, chemical removal of the columbium from the flotation underflow, and leaching of the residue to remove the uranium.

In 1953 the Molybdenum Corporation of America discovered a columbium-tantalum rare-earths deposit in the Oka district, Two Mountains County, Quebec. A considerable amount of exploration work by various companies has since outlined large columbium-bearing areas associated with tantalum, rare earths, radioactive elements and magnetite-ilmenite minerals. The Quebec Columbium Ltd. property in this area is reported to contain an

The following is the second and concluding portion of an article extracted from a survey of columbium and tantalum prepared by R. J. Jones, of the Mineral Resources Division, Mines Branch, Department of Mines and Technical Surveys, Canada (Memorandum Series No. 135, price 50 cents). This extract notes only a few of the more important Canadian occurrences.

estimated 30,000,000 tons averaging 0.6 per cent Cb_2O_5 in one zone and 25,000,000 averaging 0.35 per cent Cb_2O_5 in another zone. Columbium Mining Products Ltd. has outlined some 30,000,000 tons of material averaging 0.35 per cent Cb_2O_5 .

Concentration and Extraction

Columbium has a high specific gravity. In the preliminary concentration of alluvial or tailing deposits it is removed together with cassiterite, etc., by means of sluice-boxes or jigs.

The concentrate from the riffles is separated into its constituent minerals by a variety of processes employing gravity concentration, pneumatic tabling, magnetic separation and electrostatic separation.

In magnetic separation, the ilmenite and magnetite are removed first, leaving a mixture of magnetic cassiterite, columbite, zircon and monazite. The magnetic cassiterite is removed on the air flotation tables. The monazite and zircon are removed from the columbite by electrostatic separation, leaving a marketable columbite product.

Columbium and tantalum are extracted simultaneously from their concentrated ores by fusion methods. The tantalum and columbium salts are then separated from impurities and the metals from each other.

The Bureau of Mines, U.S. Department of the Interior, has developed a liquid-liquid extraction process for the separation of tantalum and columbium from their combined concentrates. Géomines tin slag was successfully treated by this process, which will be employed by Fansteel Metallurgical Corporation at its new refinery at Muskosee, Oklahoma.

The Mines Branch of the Department of Mines and Technical Surveys, Canada, has proposed improvements in the acid mixture which may lead to a better separation of the two metals and to the elimination of impurities.

Norway's Sove ores containing koppite are dressed by a method based on gravity concentration and leaching with nitric acid.

Columbium is a malleable and ductile metal, extremely resistant to corrosion and to most types of chemical attack, and completely soluble in sulphuric acid.

Tantalum is very ductile and malleable under special

treatment and is highly resistant to almost all forms of corrosion; in fact, it is similar to glass and is attacked by hydrofluoric acid. Tantalum has a higher melting point than all other metals except tungsten and rhenium.

Tantalum and columbium absorb hydrogen when heated and also combine with other gases such as oxygen and nitrogen. Both metals will not oxidize at room temperatures, but when heated in air become coated with oxide.

	Columbium	Tantalum
Atomic number	41	73
Atomic weight	92.91	180.9
Specific gravity	8.4	16.6
Melting point	2,500 deg. C.	2,996 deg. C.
Boiling point	3,300 deg. C.	plus 4,100 deg. C.

The uses of columbium as a pure metal have not been developed, as has been the case with tantalum. Apart from its use as a "getter" in vacuum tubes and as a sheath in nuclear power reactors, columbium is used in the form of ferrocolumbium, ferrotantalum-columbium and columbium carbide.

Tantalum and columbium are both used in the carbide form either alone or in combinations with tungsten and titanium carbides. Potassium tantalum fluoride, columbium oxyfluoride and potassium columbate are used as starting chemicals in the preparation of other tantalum and columbium compounds.

The largest use of columbium is in the form of ferrocolumbium and ferro-tantalum-columbium in the manufacture of stabilized austenitic steels of the 18-8 type. This type of steel without the addition of a carbide stabilizer is adversely affected by heating to a temperature of from 400 deg. to 850 deg. C.

The development of very low-carbon ferrochrome and heat treatment of stainless steels has obviated the use of columbium to a large degree except for certain definite end uses. For instance, when it is impracticable or too expensive to dissolve carbides by heat treatment, columbium-bearing steel is used; e.g., in large field-erected welded equipment for the chemical, oil and food industries and exhaust systems for aircraft engines. The columbium content of such steels is about 1 per cent.

Columbium-bearing electrodes are used for welding columbium-stabilized stainless steel. Stainless-steel castings stabilized with columbium are used in conjunction with wrought alloy stabilized steels.

Columbium is used for imparting creep resistance to certain alloys for high-temperature applications such as turbine wheels and buckets of jet aircraft engines. The advent of guided missiles and rockets will probably call for an ever-increasing quantity of columbium.

Small amounts of columbium, cerium, chromium, titanium, tin and lead are added to some aluminium casting alloys. These alloys are widely used in the U.K. in the construction of internal-combustion engine cylinder blocks and crankcases.

Consumption in the Nuclear Field

In the production of power by means of fissile materials, the fuel must be protected from the cooling media by means of a protective sheath called a can, which must be able to withstand the action of the fuel and the coolant but must not absorb the emitted neutrons. This can is subjected to corrosion at high temperature and it or its oxide must be stable and resistant to further corrosion. Possible columbium and tantalum consumption in this field will depend upon their nuclear properties, strength,

fabrication properties, price and supply compared with other suitable metals.

Because of its chemical inertness, tantalum is extensively used in the manufacture of acid-proof equipment and surgical implants.

Certain materials are used in the manufacture of vacuum tubes to absorb or combine with residual gases in the tube, among them being columbium and tantalum. Tantalum is used to a greater extent because of its high melting point and ease of fabrication in addition to its gettering properties.

Columbium 95 and tantalum 182 with half-lives of 35 days and 115 days respectively, are in commercial production.

Tantalum finds applications in the production of rectifiers, high-voltage surge arresters for the protection of railway signalling equipment, and electrolytic condensers of high capacity.

Columbium and tantalum, in common with various other metals, form carbides which have the required properties for use in cemented carbides. The carbides possess the highest melting points of all substances and are used in blades for jet-engines, as well as for valves, valve seats and guides for high-power reciprocating engines. Tantalum and columbium carbides are added to alloys composed principally of cobalt, chromium and tungsten to form a series of wear-, heat- and corrosion-resistant alloys.

Tantalum pentoxide is used with potassium oxide and silica in the production of optical glass with a high refractive index.

An alloy containing 7.5 per cent tungsten, the balance being tantalum, maintains its elasticity when heated to a high temperature and is used extensively in electronic tubes.

Plastics for Mine Lighting

AN exhibition devoted to "Plastics in Lighting" is being held from March 25 to March 29 by the Plastics Division of Imperial Chemical Industries Ltd. at the Mayfairia, London. While many of the exhibits relate to general industry, the section devoted to mining nevertheless presents an impressive insight into the growing role played by plastics fittings in underground lighting installations.

The exhibition displays metal-filament lamp mines lighting fittings with thick opal Perspex diffusing covers, circular fluorescent lamp fittings enclosed by shaped Perspex dishes designed for strength, and a mine roadway fitting in which the lamp is enclosed by a Perspex tube.

The maintenance of strength and consistency when shaped is naturally desirable in a light-transmitting material for mine lighting fittings, and Perspex is forwarded as combining these properties in more marked degree than any other material. It is, in addition, easy to shape the while being available both in clear form and in a range of opals for diffusing fittings.

Perspex was used during the Second World War as a glazing for aircraft, and in recent years has contributed much to the improvements made in the standards of general lighting.

The major part of the exhibition is devoted to the many and varied uses of Perspex, but there are examples also of the extensive uses now being found for Diakon acrylic powder and Darvic p.v.c. sheet and foil.

The exhibition comprises 170 fittings.

Coal Mining Developments in Britain

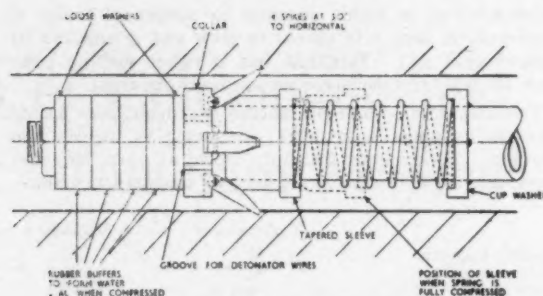
MANY of the developments continually reported from the coal mines of the United Kingdom are of a quite minor nature, yet their total effect on efficiency is marked. The realization is perhaps the more pleasing when it is realized that an impressive total of effective devices are born of the technical "know-how" and experience of employees of the industry.

The Dala safety device for pulsed infusion shotfiring on infusion tubes which are not otherwise fitted with a safety catch has been designed in No. 1 Area, South Western Division. The catch consists of a collar to which four spikes are hinged. A tapered sleeve, which is held in the forward position by a spring, forces the four spikes outwards. The spring is retained by a fixed cup washer.

The whole device is mounted on the barrel of the infusion tube just to the rear of the rubber washers, and in no way interferes with the normal sealing action of the rubbers. When the tube is being inserted, the tapered sleeve is pulled back by hand to allow the spikes to enter the hole freely. The tapered sleeve is then released, and the action of the spring working through the tapered sleeve keeps the spikes firmly against the walls of the shot-hole.

The tube can be pushed forward but any outward thrust will cause the spikes to dig into the walls of the shot-hole and resist until the coal has broken away. This prevents ejection of the tube when detonation occurs.

A novel form of slusher bucket at Gilmerton Colliery in the Scottish Division, has given good performance in use



The Dala safety catch

in the Blackchapel seam at the colliery. The design consists of a self-loading skip and a discharge ramp. It has been developed for loading from a tightly packed coal pile, travelling over a roadway without rails, and discharging automatically.

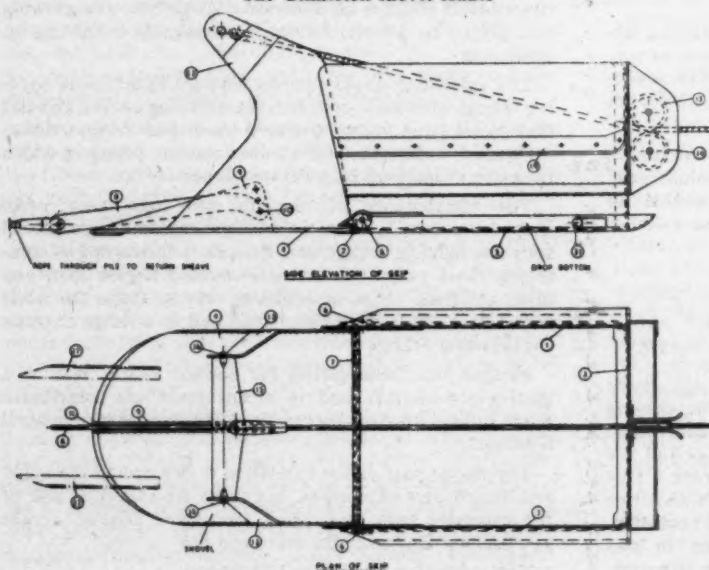
The skip consists of a box with three fixed sides (1, 2 and 3), a loading shovel (4) which forms the fourth side of the box when raised and a hinged drop bottom (5). The bottom is attached to the sides by the pivot pins (6) and the shovel is attached to the bottom by the hinge pin (7).

The skip is pulled into the pile, with the shovel lowered, by a tail rope which is attached to the shovel by a link (8) and passes through the pile to a return sheave. The link (8) passes between the fins (9) to which it is attached by the pin (10). The shovel is cut away between the fins to form an open slot (11) to allow the shovel to be raised without raising the tail rope. The sides (12) of the shovel are extended to take the attachment for the direct hauling rope which also raises the shovel. The direct rope passes between sheaves (13 and 14) on the front of the skip to a bar (15) which spans between, and is pivotally attached to, the sides of the shovel at (16). When the shovel has been dug into the pile by the pull of the tail rope, the direction of pull is reversed and the pull of the direct rope raises the shovel to load the skip and haul it towards the discharge ramp.

A machine to spray mine roadways with a fire resistant mixture has been designed at Bestwood Colliery, Nottinghamshire. The machine consists of a cylindrical tank, 4 ft. long, with a dia. of 1½ ft. It is of all welded construction and tested to 200 lb. p.s.i. It is mounted on a bogey with wheels to fit the roadway track. The fireproofing mixture requires continual mixing while it is being applied, and to accomplish this a shaft is provided longitudinally through the tank, with three long paddles attached. The shaft is rotated by the power unit of a compressed air boring machine.

A filling aperture of 7½ in. dia. is provided at the top of the tank. The tank is filled with a mixture of six gals. of water, six gals. of sodium silicate, and six bags of limestone dust. A small quantity of bentonite is added to help maintain the smooth mixture of the ingredients. After the filling aperture has been sealed, compressed air is admitted to the tank. The pressure is of the order of 25 lb. per sq. in. At the same time air is admitted to the hand spray by a valve which connects the gun to the compressed air supply through a rubber hose of ½ in. bore.

The Gilmerton shovel loader



MINING MISCELLANY

The Steep Rock Iron Ore Co. is to work a four-day week as from today because of reduced demand.

A new company, Ab Perno Oy, has been formed to work the uranium deposits in Southern Finland. It is hoped that the mine will yield an average of 5 kg. of uranium per ton of ore.

A company has been formed with the participation of the Portuguese Government, the Companhia de Diamantes de Angola and the Diamond Corporation to establish a diamond cutting industry in Portugal. The company has a capital of the equivalent of £1,875,000.

The new £1,500,000 treatment plant built by De Beers at Kimberley, reported to have four to five times the capacity of any similar construction on the O.F.S. goldfields, has gone into operation after being constructed in 10½ months. The stockpile will hold some 4,500 tons of blue ground.

According to the Peking radio, China and Hungary have signed a trade agreement for 1958, providing amongst other commodities, for the export from China to Hungary of mineral products.

Arrangements have been made with U.S. concerns for financing the opening up of iron-ore mines at Acari, in the department of Arequipa, Peru, which are owned by Pan-American Commodities S.A. A loan of \$U.S.4,800,000 by the American Overseas Finance Corporation of New York has been guaranteed by the Peruvian Government. Production of ore is expected to begin in March, 1959,

at an annual rate of 1,000,000 tons, to be stepped up eventually to 3,000,000 tons.

Small-scale industrialists in India requiring non-ferrous metals have been asked to furnish information about their consumption in 1956 and 1957, giving separate figures of actual production of end-products during the two years and the amount of import quotas established. This is to enable the government to take some measures to remedy the difficulties experienced by small industries in the procurement of non-ferrous metals.

A new British Standard (B.S. 2955: 1958) defines a number of selected terms applicable to metallic and non-metallic powders. Industrial safety helmets (light duty) are the subject of a revised specification (B.S. 2095: 1958). Copies of both standards are obtainable from the British Standards Institution, Sales Branch, 2 Park Street, London, W.1.

Promising deposits of manganese are unofficially reported to have been located in Venezuela, both in the State of Anzoategui and in the Delta Amacuro region. Manganese deposits in Bolivar State are already being exploited, though operational difficulties have been experienced. The search for commercially exploitable bauxite continues, and a Canadian expert has been engaged under U.N. technical assistance arrangements to make a survey of potentialities. Previously the Venezuelan authorities had been counting on an air survey to provide the necessary ground information, but it has not proved successful for this purpose, and investigations on the ground have thus become essential. They will be slow, as

the likely country is mostly jungle.

The report of last year's work of the Tin Research Institute indicates that all departments were actively engaged in pursuing new ideas and developing fresh applications for tin. A notable achievement was the publication of a method of producing electroplated deposits of tin in a fully bright form. The Institute's invention of a method of bonding aluminium-tin-bearing alloys to steel has now reached the commercial stage of development and thousands of cars have already been fitted with the new type of bearings. Organotin compounds were investigated for a great variety of purposes during the year and a notable use appears to be developing as a fungicide in agriculture.

The internationally known architectural and engineering firm of Skidmore, Owings and Merrill has been retained by the Lead Industries' Association to make a study of present and potential uses of lead in building construction. This is considered another important step by the lead industry in its intensive programme to realize the full possibilities of this metal under modern conditions. The firm is currently engaged in the design and supervision of construction of such buildings as the new Chase Manhattan Bank and Union Carbide Buildings in New York, the Air Force Academy at Colorado Springs, and the Crown Zellerbach building in San Francisco.

Exports of tin concentrates from Thailand rose last year to 311,377 piculs (18,832 tonnes) from 289,881 piculs (17,531 tonnes) in 1956.

It is hoped that measures recently adopted in French Guinea will go some way towards reducing the volume of smuggling, which has severely affected legal exports of diamonds from this territory. The principal diamond-mining company in French Guinea, in order to prevent invasion of its concession by illicit miners, surrendered a large portion of its terrain to a Government Co-operative. A diamond-buying organization has been set up consisting of a number of independent experts, principally French, but also of other nationalities.

An expert of the U.S. concern, Kaiser Engineers, has been visiting Greece for consultations with the authorities on the question of building an aluminium electrolysis plant in the Parnassus area, near extensive bauxite deposits. It is understood that Kaiser has already tested samples of Greek bauxite and also brown coal and brown coal briquettes from the Ptolemais area.

A new organization, to be known as the British Conference on Automation and Computation, has been set up in the U.K. to facilitate the exchange of information regarding the activities of the individual societies within this field, and comprises three main groups. Group A—the British Group for the Engineering Applications of Automation—was formally constituted on February 20. The other two groups are concerned respectively with computation and automatic



Visiting Russian engineers at the site near Chesterfield, where Humphreys and Glasgow Ltd. are constructing Britain's underground gasification pilot plant for the N.C.B. In the background is the headgear of one of the five shafts of the pilot plant, which is expected to be producing gas by the end of this year

control and with the sociological and economic aspects of automation techniques.

Since the discovery of copper-bearing ore deposits in the region of Sierosowice and Lubin (Wroclaw voivodship), Poland, further detailed geological research work has confirmed the existence of copper-bearing ore with an average copper content of 1.4 per cent. The deposits cover an area 14 miles long by four miles wide. The ore is 2,000 ft. deep and the layers of copper-bearing ore are about 90 in. thick. The deposits also contain zinc, lead, silver, vanadium, and small quantities of cobalt and molybdenum.

An agreement has been signed in Chile between the National Electric Corporation (ENDESA) and the National Smelting Co., under which the latter concern will lend ENDESA the sum of \$60,000,000 pesos in order to enable it to connect its southern and central electrical networks. This will enable electrical power to be supplied to the Central copper smelting plant at Ventanas, near Quinteros, as well as to various copper and iron mines, and will help to open up a vast region in which minerals are known to exist.

The continued low prices for base metals have enforced deferment of plans by Heath Steel Mines Ltd., a subsidiary of American Metal Climax Inc., to bring its lead-zinc-copper mine in New Brunswick, Canada, into full operation. Activities at the mine will be drastically curtailed. The mine and plant will continue breaking-in operations at less than one-third of the rated capacity of 45,000 tons of ore per month. A small staff and crew will be maintained primarily to continue development and metallurgical work in preparation for full operation when base metal prices recover.

Production is scheduled to start at the Saint Patrick Mines in Avoca on July 1. Work on the new flotation mill on the site is now almost completed and already about 100,000 tons of ore have been stockpiled for immediate use. When working at full capacity, the new flotation mill will process some 4,000 tons of ore per day, producing 150 tons of copper and 400 tons of pyrite containing sulphur. So far about £2,000,000 has been spent on underground development and construction work on the surface. Meanwhile, exploratory work has ceased at two other Irish mines in which the Canadians were interested. At Castleblaney, County Monaghan, where efforts were made some eighteen months ago to re-open the lead and zinc mines, all work has ceased. In Beauparc, where the Emerald Isle Mining Co. Ltd., a subsidiary of Can-Erin Mines Ltd., of Toronto—were dewatering the shafts of the old copper mines, the work has been abandoned, and is unlikely to be restarted so long as the price of copper remains at its present level.

Three private investment organizations, the American Overseas Finance Co., the Bank of America (International), New York, and J. Henry Schroder Banking Corp., and the International Finance Corp., signed agreements in New York on March 25 providing for loans amounting to \$6,400,000 as part of a financial programme totalling \$12,800,000 to develop a copper mine and smelter owned by Empresa Minera de Mantos Blancos SA, a Chilean corporation. The properties are

located forty-five miles north-east of Antofagasta, the largest city and port in Northern Chile. Empresas Sudamericanas Consolidadas SA and Marvis Corporation SA, owned by the Hochschild Group, are supplying equity of nearly \$6,400,000 to Mantos Blancos. For several years work has been under way, defining the ore-bodies and, through pilot plant operations, developing a satisfactory metallurgical process. Construction of the mill and refinery have started. When in operation, the mill will process 2,000 tons of ore per day, producing about 25,000,000 lb. of refined copper per year. The loan financing is as follows: American Overseas Finance Co., \$2,000,000; Bank of America, \$1,600,000; J. Henry Schroder, \$600,000; and the International Finance Corp., \$2,200,000.

McIntyre Porcupine Mines is the first gold mine in North America to put into operation a European-invented friction-type hoist as part of its \$1,500,000 project to cut costs and increase efficiency.

PERSONAL

Mr. C. W. Engelhard, chairman of Engelhard Industries in Newark, United States, has been appointed chairman of Rand Mines. He will succeed Mr. W. M. Frames, who retires in May, but has told the board that his public and private duties will preclude his holding the chairmanship beyond the end of 1959.

When Mr. Engelhard becomes chairman, Mr. W. Marshall Clark and Mr. G. V. R. Richdale will be appointed deputy-chairmen, and Lord Bailieu will be invited to join the board. Mr. P. H. Anderson and Mr. T. Reekie will become joint managing directors.

We regret to report the death of Mr. K. Evers-Swindell, a director of the Heidelberg Estates and Exploration Co. Ltd. and of its subsidiary, Boschoek Proprietary Co. Ltd.

Messrs. H. F. Wilson and C. L. G. Fairfield have been appointed to the board of the Telegraph Construction and Maintenance Co. Ltd.

The address of the Raw Materials Division of George Cohen Sons and Co. is now Raw Materials Division, Trinity Road, Kingsbury, Tamworth, Staffs.

CONFERENCES AND EXHIBITIONS

On April 2, W. Hodgkinson, deputy-chairman, North-Western Gas Board, will address the North-Western Fuel Luncheon Club.

The summer meeting of the Institution of Mining Engineers will be held in Birmingham from July 2 to 4, 1958.

The Niagara Frontier Section of the Metallurgical Society of the American Institute of Mining, Metallurgical and Petroleum Engineers has announced that the Third Reactive Metals Conference and Exhibition will be held at the Statler-Hilton Hotel, in Buffalo, on May 27, 28 and 29. Among the metals to be covered are columbium, uranium, tantalum, rhenium, hafnium, tungsten, thorium, titanium, vanadium, molybdenum, and zirconium.

Manchester Geological and Mining Society will meet on May 3 at Wigan Mining and Technical College; the Midland Counties Institution of Engineers

meets at the University, Nottingham, April 14, 15, 16, and at the Mines Rescue Station, Ashby-de-la-Zouch, on May 14; the Midland Institute of Mining Engineers will meet in Sheffield on May 1; the North of England Institute of Mining and Mechanical Engineers will meet at Newcastle-on-Tyne on April 16; the North Staffordshire Institute of Mining Engineers at the North Staffs. Technical College on April 14; the South Staffordshire and Warwickshire Institute of Mining Engineers at Cannock Mining College on May 1; and the South Wales Institute of Engineers in Cardiff on April 24.

The general meeting of the North Staffordshire Institute of Mining Engineers will be held at Stoke-on-Trent on April 15; the general meeting of the North of England Institute of Mining and Mechanical Engineers will be held on April 6; the general meeting of the South Staffordshire and Warwickshire Institute of Mining Engineers is to be held at Tamworth on April 17; the general meeting of the Midland Counties Institution of Engineers will be held on May 15 at Nottingham.

Dr. C. G. Addingley, director and chief chemist, British Belting and Asbestos Ltd., delivered the ninth annual lecture of the Plastics Institute at Leeds University on March 13. The subject was "Plastics in Conveyor Belting, with special reference to the Mines".

This year the annual course for laymen will be held by the Ross Institute of Tropical Hygiene from July 14-18 inclusive. The course is designed specially for planters, mining engineers and other non-medical people who may be responsible for the health of industrial labour forces in the tropics.

Conveyor belting with a nylon weft will be shown by British Nylon Spinners at the Industrial Textiles Exhibition, Royal Albert Hall, London, April 14 to 18, where new types based on extra high-tensile nylon yarn will be seen. It is claimed that this belting has a longer life under severe coal-face conditions and is highly resistant to longitudinal tearing.

The Western Electronic Show and Convention will take place from August 19 to 22, 1958, at the Pan-Pacific Auditorium, Los Angeles.

The thirteenth Instrument-Automation Conference and Exhibition will be held in the Philadelphia Convention Hall from September 15 to 19, 1958.

Several hundred industrial leaders, engineers, scientists and other specialists from 40 countries are to meet in Harrogate this June for the 1958 assembly of the International Organization for Standardization. It will be the first time the ISO assembly has been held in Britain; previous meetings were at Stockholm (three years ago) and before that in New York and Paris. The 1958 series of meetings of the full assembly, of the ISO Council, and of 15 specialized technical committees, will be opened on June 9 by ISO's president, Sir Roger Duncalfe, and they will continue until June 21. Arrangements are in the hands of the British Standards Institution.

The American Mining Congress is to hold its 1958 Mining Show at the Civic Auditorium and Civic Centre Exhibit Hall, San Francisco, California, from September 22 to 28.

Machinery and Equipment

Spring Look for Safety

With spring officially announced, British manufacturers of safety equipment have burst forth with a wide range of varied tools designed to ensure that mineworkers see springtimes subsequent to that of 1958.

For the first time since industrial helmets have been produced in this country, Panorama Equipment Ltd. are able to introduce the first industrial safety helmet bearing a Kite Mark under Licence 2820, to B.S.S. standard. The shell of the Lifeguard is of aluminium alloy, and the hat is designed for mining and quarrying amongst other duties. The harness comprises six $\frac{1}{8}$ in. looped webbing construction tapes, and the distance between the harness and the crown of the shell should be 1½ in. The helmet weighs 13 oz. complete with harness and chinstrap.

The R.J. gas indicator range, manufactured by Joberg Ltd., is now also available in the U.K. These gas indicators are small portable instruments that compare a gas mixture under test in one chamber with a reference gas (usually air) in a second chamber by interferometric methods. Sensitivity is achieved to 0.1, 0.02, and 0.005 per cent. The air to be tested is sucked into the sampling chamber and results are read directly off the scale visible through an eyepiece. It is claimed that it is possible to measure a great range of combustible and toxic gases with consistent accuracy by means of this method. Among the gases measured have been methane, and carbon monoxide.

A new harness has been produced by Nife Batteries that enables their hydrogen and pentane intrinsically safe cap lamps to be used also as chest lamps.

In the meantime, Siebe, Gorman and Co. Ltd., have published details of their wide range of protective equipment. These equipments cover proto apparatus, self-contained breathing apparatus, smoke helmets, gas and dust masks, resuscitation equipment, helmets, head coverings and goggle of all types, as well as articles of all manner of apparel. Fire extinguishers and first-aid outfits complete an impressive list.

RODS WITH STAINLESS LININGS

Corrosion of the inner wall of drill rods, coupled with the increasing efficiency of rock drills has been for some time a substantial feature contributing to breakages in many types of rod. The Consolidated Pneumatic Tool Co. have announced that they are now supplying C.P. Seco Steel with stainless steel linings to eliminate the incidence of failure due to this cause.

This development has been brought about by the greater stresses involved when the steel is used in conjunction with modern high-efficiency drills. Corrosion of the inner wall of untreated steel gives rise to points of weakness which are developed under stress until failure occurs.

With the incorporation of a stainless steel lining into an already perfected tungsten carbide tipped drill rod,



variations in the structure at heat treatment points have now been nullified and failure initiated by corrosion during rod life has been eliminated. Other advantages arising from the new linings are greater footage per rod resulting from higher fatigue strength, better flushing due to a correctly sized, smooth-walled bore and greater economy in drilling.

NEW RANGE OF PUMPS

A new range of self-priming pumps is being introduced to British and overseas markets by Hill-Barnes (Pumps) Ltd., who have just initiated a production programme in their new works at at Markfield, Leicester. The pumps are being made under licence to the design of the Barnes Manufacturing Co., Mansfield, Ohio, U.S.A.

The licence covers the manufacture and sale throughout the world of the entire Barnes' range, which includes standard and self-priming centrifugal pumps and domestic water systems capable of lifting water from 200 ft. deep wells when aided by patented ejectors.

The principal advantage claimed for the design is that the pump will prime

down to 25 ft. suction lift with as little as one-third of the normal water level in the pump body. By virtue of this feature, leakage of water through the discharge connection or suction check valve whilst the pump is standing idle or being transported will not affect the self-priming characteristic.

The pumps are available in sizes from ½ in. to 6 in. dia. hose connections, with discharges from 1,000 to 90,000 gal. per hour. They can be employed with heads up to 400 ft. Each size will handle solids up to 25 per cent of the flow, with dia. up to one-quarter that of the suction connection. The pump is directly seated on the baseplate.

The body is constructed of thick section material and the design is notable for the absence of sharp corners thereby better withstanding water-hammer. A volute chamber is incorporated enabling the pump to be used over a wide range of speeds. The body and volute are made as an integral casting thereby obviating the risk of an internal leak from the pressure side to the suction side. The angular seat check valve is readily accessible for servicing and provision is made for adjustment of wearing parts to maintain operating efficiency.

The design is such that there is no recirculation during pumping.

LAMINATED SPRING DECK SUSPENSION

The Wilfley Mining Machinery Co. Ltd., manufacturers of the Wilfley concentrating table, announce that tests on the new Curnow type laminated spring deck suspension have now been successfully completed. This new suspension gives an almost frictionless deck movement and at the same time eliminates the necessity of oil-filled slipper housings. Power consumption has been reduced and performance increased. The machine is particularly silent in operation.

The first of these new machines is being installed at Doncaster for the recovery of metallics from foundry residues, and models will be available for the export market soon.

SHAFT SINKING IN AUSTRALIA

While circular shafts now appear to have become standard installation on the new South African gold mines, one of the most recent undertakings in Australia involves an elliptical one. The No. 3 shaft system at North Broken Hill is designed to provide for mining down to a possible depth of 5,100 ft.



Above: The Panorama Lifeguard Helmet

Below: The new Hill Barnes Pump

One interesting point of construction is that the first grab commissioned in the shaft was controlled in all its motions by vane-type motors, but the unit was later redesigned, using piston-type motors for the closing and hoisting of the grab and for the longitudinal travel of the telfer. The vane-type motor was retained for the cross traverse motion.

A second point is that lining methods and equipment used were conventional, with one interesting exception: two pneumatic vibrators were bolted to the side of the shuttering during pouring to compact the concrete and eliminate voids.



LATEST DEVELOPMENTS IN MINING EQUIPMENT

The following paragraphs present a précis of those developments that have taken place in the design and manufacture of mining machinery throughout the last year. The review will be concluded in a subsequent issue.

A patent has been obtained in the U.S.A. by C. E. Sears of the Ingersoll Rand Co. for a design of a drill steel collar that is readily attachable and detachable.

A stuck steel wrench of novel design available from Atlas Copco Eastern, Inc., can be attached at any position along the steel irrespective of the presence of a collar.

The hand tipping of scroll-type rotary drill rods increases rod life and improves performance, due to the better removal of cuttings. The practice is growing.

The Gardner Denver Model R 68 autostoper is water-controlled as a safety measure to prevent dry drilling.

A sound-absorbent sack which zips around a percussive machine, reducing exhaust noise and clatter of plates on steel by over 50 per cent, is available from the Thor Power Tool Co. of America.

Pinazza self-contained flexible-drive percussive rock drills are now available in this country. Power from a 5.5 h.p. petrol or 4.5 h.p. electric drive unit is conveyed via a flexible rotating cable to a mechanically-thrown hammer in the machine. Cuttings are removed by air flushing and the drill can be mounted on an air leg, compressed air for this purpose being available from a compressor made integral with the drive unit.

A differential drive electric rotary drill known as the PGAT 414 has recently been tested by the Mining Research Establishment at Isleworth. An ingenious combination of a powerful drive motor with a torque-sensitive feed motor affords to this equipment a flexibility in operation unusual in electrically-driven machines. Thrust is limited to a controllable pre-selected maximum, which protects both the drill bit and the machine mounting.

The Joy CD 42 hydraulically-driven

rotary drill is now available in this country. Both feed pressure and speed of rotation are infinitely variable over the working ranges.

An intrinsically safe detonator-testing ohmmeter employing a photo-cell as its source of electrical power has now been developed by Rhoanglo Mine Services Ltd., in N. Rhodesia. The dry cell power source of the familiar type of ohmmeter could possibly constitute a hazard in the event of grossly false functioning of the instrument due to damage, poor maintenance or tampering. Photocells, however, are self-limiting, and when of usual size are incapable of generating anything approaching a hazardous level of electrical power output even under short-circuit conditions and with brilliant illumination.

The instrument described by W. G. Moffat in a recent paper to the Institution of Mining and Metallurgy had a minimum factor of safety of about 600.

In the realm of heavy (100 h.p.) trolley wire haulage the successful use of welded rail joints in the mines of the Tennessee Coal and Iron Division is worthy of note. Main haulage track in

Ingersoll Rand have introduced a rock-bolting autostoper. Known as the Vacu-jet, the machine has built-in jet suction and pressure discharge of cuttings. The illustration is by courtesy of the manufacturers

these mines consists of 90 lb. rails on treated wooden ties laid on gradients not exceeding ± 6 per cent substantially ballasted and using welded rail joints. New track is fishplated, then, after it has settled in, a welding crew removes the fishplates and welds the joints. Welded joints eliminate electrical bonding and give reduced electrical resistance resulting in considerable saving in power. Furthermore, the maximum safe hauling speed is increased with obvious benefit.

Hoisting ropes with cores containing insulated copper mine conductors are now available from several American manufacturers. The use of plastic insulation together with spiral winding of the conductors is expected to result in a conductor life commensurate with that of the rope itself, and should this expectation be fulfilled conductor-cored ropes are likely to find application.

Communication between a travelling cage and the hoist operator has been provided for several years at a number of mines by VHF radio, using the hoist rope as a conductor between two transmitter-receiver installations, one carried in the cage and the other in the head frame. This system works well, but in common with other portable electronic equipment is prone to failure and requires continual changing of batteries.

Successful use of a 3-conductor rope over a period of at least 6 months is reported from the American Smelting and Refining Co.'s Galena Mine. Here in addition to conveying signals from the cage, use of the conductors is made to indicate slack rope as well as the position of the bottom-dump skip door after dumping.

Metals and Minerals

Aluminium's Favourable Prospects

Despite present difficulties aluminium producers in the U.S. remain confident that their industry will continue to grow at a much greater rate than the national economy. In Alcoa's annual report the chairman, Mr. I. W. Wilson, and the president, Mr. Frank L. Magee, point to the continued increase in the amount of aluminium used per unit of production in such major markets as motor cars.

The report refers to the short-term trends in business that have prompted Alcoa to delay completion of certain aspects of the \$600,000,000 expansion programme announced in 1956. It is emphasized that the long-term forecasts on which this programme was based remain unchanged. The programme will be spread over a longer period than was originally contemplated and newly-planned capital expenditures are to be devoted primarily to cost-saving improvements in facilities and in the development of new and improved products. Meanwhile, idle capacity can be started up fast enough to meet any foreseeable increase in demand.

Pointing out that demand for aluminium remains high, particularly in Europe, an official of the Anaconda Co. told the House Small Business Committee in Washington that, barring unforeseen and unpredictable events, the present balance between supply and demand in aluminium would progressively even out between now and 1960. Anaconda does not believe that there is likely to be an appreciable further replacement of copper by aluminium immediately.

The company expects to complete by April 1 the first phase of a large pilot plant for the processing of alumina from domestic clays, but at least a year will be required before the commercial advantages of the operation can be established.

Indicative of the rapid growth of the aluminium industry in Europe was the announcement by Field-Marshal Earl Alexander, chairman of the Northern Aluminium Co., that the company plans to spend £10,000,000 over the next four years, of which nearly £8,000,000 will be for new plant and buildings.

In Canada Alcan is now operating at only 80 per cent of capacity because of lack of demand. Nevertheless, Mr. N. Davis, president of the parent company, Aluminium Ltd., was able to tell the House Small Business Committee that this company was spending large sums to expand basic production and had confidence in the long-range growth of the industry and consumption of the metal.

It has been announced by Canadian-British Aluminium Ltd. that the first shipments of ingots for Britain will leave the Baie Comeau aluminium plant on April 15. The company's smelter started production last December. If necessary, all the plant's output will be bought by British Aluminium in the U.K.

Mr. Ernest Evans, the Queensland Mining Minister, forecasts that Central Queensland will be the site of an £A45,000,000 aluminium industry using

Cape York bauxite. He was commenting on an option agreement between the Commonwealth Aluminium Corporation Proprietary Ltd., which has interests in Weipa bauxite, and two companies on the Blair Athol coalfields—Blair Athol Coal and Timber Ltd. and Blair Athol Open-Cut Collieries Ltd. The purpose of the option is to enable Commonwealth Aluminium to investigate, over a period of five years, the possibility of using Blair Athol coal to fuel a power station supplying current to an aluminium smelter on the Queensland coast.

The Ghana Development Commission announced late last week that under present circumstances Aluminium Ltd. of Canada was not in a position to proceed immediately with the Volta River project. The decision follows conversations between representatives of the Ghana Government and the company. Despite the decision, however, it has been announced that the company does not wish to stand in the way of other interested parties. In the meantime, the Ghana Government is examining the position in consultation with the U.S. Government.

It is understood that Aluminium Ltd.—which holds large bauxite concessions in Ghana—would now be prepared to negotiate for their ultimate release provided

the Volta scheme was implemented. The company would, however, still continue to maintain an interest in the project.

Kaiser Aluminium and Chemical Corporation plans to close two of the eight potlines at its Mead (Washington) plant and half a potline at its Tacoma plant. The reasons given are "general economic conditions and a continuing over-supply of aluminium."

RECORD ZIRCONIUM ORDER

The largest order ever placed for zirconium tubing, amounting to almost 44 miles of material, is being processed in the U.S. by Mallor-Sharon Metals Corporation, in conjunction with Bridgewater Brass Co., for use in the Commonwealth Edison Co.'s Dresden Nuclear Power Station near Chicago. The tubing is made of reactor grade zirconium, 9/16 in. dia. and 1/32 in. wall thickness, and meets rigid tolerances. It is to be given special pressure, sonic and corrosion tests.

Another major U.S. producer, Columbia-National Corporation, has announced shipment of its first batch of nuclear-grade zirconium sponge to the Atomic Energy Commission. This company holds a \$22,750,000 contract to

LONDON METAL AND ORE PRICES, MAR. 27, 1958

METAL PRICES

Aluminium, 99.5%, £197 per ton	Iridium, £26 oz. nom.
Antimony—	Lanthanum (98/99%) 15s. per gram.
English (99%) delivered, 10 cwt. and over £190 per ton	Manganese Metal (96% - 98%) £310
Crude (70%) £190 per ton	Magnesium, 2s. 5d. lb.
Ore (60%) basis 19s. 6d./20s. 6d. nom per unit, c.i.f.	Nickel, 99.5% (home trade) £600 per ton
Arsenic, £400 per ton	Osmium, £20/£22 oz.
Bismuth (min. 1 ton lots) 16s. lb. nom.	Osmiridium, nom.
Cadmium 10s. 0d. lb.	Palladium, £7 10s. oz.
Cerium (99% net), £13 18s. lb. delivered U.K.	Platinum U.K. and Empire Refined £27 10s. oz.
Chromium, Cr. 99% 7s. 2d. lb.	Imported £23/£24
Cobalt, 16s. lb.	Quicksilver, £77/£78 ex-warehouse nom.
Germanium, 99.99% Ge. kilo lots 2s. 8d. per gram	Rhodium, £40/£42 oz.
Gold, 249s. 4d.	Ruthenium, £15/£18 oz. nom.
	Selenium, 50s. 0d. per lb.
	Silver, 76d. f. oz. spot and 76d. f'd.
	Tellurium, 15s./16s. lb.

ORES AND OXIDES

Bismuth	30% 3s. 0d. lb. c.i.f.
Chromite Ore—	20% 3s. 3d. lb. c.i.f.
Rhodesian Metallurgical (semifriable) 48%	£17 5s. 0d. per ton c.i.f.
Hard Lump 45%	£18 0s. 0d. per ton c.i.f.
Refractory 40%	£12 5s. 0d. per ton c.i.f.
Smalls 44%	£16 5s. 0d. per ton c.i.f.
Baluchistan 48%	£12 0s. 0d. per ton f.o.b.
Columbite, 65% combined oxides, high grade	nom.
Fluorspar—	
Acid Grade, Flotated Material	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF ₂)	156s. 0d. ex works
Lithium Ore—	
Petalite min. 34% Li ₂ O	47s. 6d./52s. 6d. per unit f.o.b. Beira
Lepidolite min. 34% Li ₂ O	47s. 6d./52s. 6d. per unit f.o.b. Beira
Amblygonite basis 7% Li ₂ O	£26 5s. per ton f.o.b. Beira
Magnetite, ground calcined	£28 0s./£30 0s. d/d
Magnetite Raw (ground)	£21 0s./£22 0s. d/d
Manganese Ore Indian—	
Europe (46% - 48%) basis 67s. 6d. freight	nom.
Manganese Ore (43% - 45%)	nom.
Manganese Ore (38% - 40%)	nom.
Molybdenite (85% basis)	8s. 5d. per lb. (f.o.b.)
Titanium Ore—	
Rutile 95/97% TiO ₂ (prompt delivery)	£39/£40 per ton c.i.f. Aust'n
Ilmenite 52/54% TiO ₂	£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)	95s. 0d./100s. 0d. per unit c.i.f.
Vanadium—	
Fused oxide 90 - 95% V ₂ O ₅	£10 per unit c.i.f.
Zircon Sand (Australian) (65 - 66% ZrO ₂)	£16 per ton c.i.f.

supply 1,750 s.tons of zirconium to the A.E.C. over a five-year period. Over and above the 350-ton production capacity required for this contract, the company can produce up to 400 s.tons per year for civilian reactors manufactured by private industry. Shipments of commercial-grade zirconium, containing 2 per cent hafnium, began in October, 1957. The lower cost commercial grade is of interest to the chemical processing and other industries because of its high corrosion resistance.

NEW LIFE FOR MARANBOY ?

Australia's Commonwealth Bureau of Mineral Resources is to carry out a diamond-drilling investigation of the Maranboy tinfield in Northern Territory. The survey will help to determine whether the field can be developed for the eventual large-scale production of tin metal.

The drilling arrangements for the project have been agreed between the government and United Uranium N.L., which holds options over the major portion of the Maranboy field. All information arising from the drilling operations

will be made immediately available to the company. Should United Uranium reach the stage of producing tin concentrates, it will reimburse the government for the costs of drilling.

HIGHER MAGNESIUM PRODUCTION

Preliminary figures issued by the Bureau of Mines, U.S. Department of the Interior, place world production of magnesium in 1957 at 168,000 tons, as compared with 157,000 tons in 1956. The U.S. continued to be the largest world producer and was the only country to report any appreciable increase in output of primary metals for the year. It produced 81,263 tons as against 68,346 for 1956.

Small increases were indicated for Italy (4,300 tons against 4,097 tons) and for France (1,730 tons against 1,676 tons). Canada produced 8,037 tons last year against an estimated 10,000 tons in 1956, while Norway also showed a slight decrease—from 8,267 tons to 8,000 tons. Russia, the second largest world producer, is estimated to have produced 60,000 tons last year—virtually the same as in 1956.

China, but it can be said that there is no foundation whatever for this statement.

On Saturday, the stocks in official warehouses amounted to 17,927 tons, which was an increase of just over 100 tons from the previous week's figure. The British Bureau of Non-Ferrous Metal Statistics showed that tin used in the U.K. in January amounted to 1,734 tons compared with 1,420 tons in December. Stocks at the end of January amounted to 18,578 tons as opposed to 15,815 for a month earlier, and it is assumed that the majority of this increase is held by the buffer stock manager. On Thursday morning, the Eastern price was equivalent to £743½ per ton c.i.f. Europe.

NO LEAD-ZINC STOCKPILING AFTER JUNE 30

The lead and zinc markets have again had an uninteresting week with prices fluctuating narrowly—usually in sympathy with the copper price. Demand on this side of the Atlantic remains of a routine nature, but at a satisfactory level, whilst in the United States demand is still adversely affected by the general trade situation and more especially by that existing in the motor trade. There is still no news of the recommendations to be made by the Tariff Commission, and cynics are now pointing out that the legal deadline of June may only be beaten by a small margin.

During the week an announcement was made in Washington that no purchases of lead and zinc for the stockpile are planned for the fiscal year starting July 1, and it seems doubtful whether any considerable tonnage will be purchased between now and then. The British Bureau of Non-Ferrous Metal Statistics shows that the off-take of lead during January amounted to 29,607 tons against 26,530 for December, and the off-take for zinc during January was 27,473 against 24,419 in December. Stocks of both metals also showed a slight decline at the end of January, the figure for lead being 49,134 against 51,295 tons and for zinc 43,308 tons against 44,926 tons.

In Europe, in spite of reported shortages of raw materials for the zinc smelters, the latest figures issued by the O.E.E.C. show that more zinc was produced in February than in January, the figures being 65,263 tonnes against 60,623 tonnes, so it is becoming obvious that the results of the various cutbacks announced are still not having their effect upon the availability of metal in Europe. In America, it is believed that the off-take is now in excess of production, but the margin is still extremely small.

Closing prices are as follows:

	Mar. 20		Mar. 27	
	Buyers	Sellers	Buyers	Sellers
COPPER				
Cash	£174½	£174½	£178	£178½
Three months ..	£174½	£174½	£177½	£178
Settlement ..	£174½		£178½	
Week's turnover	11,050 tons		9,950 tons	
LEAD				
Current ½ month	£75½	£76	£74½	£75
Three months ..	£75½	£75½	£74½	£75
Week's turnover	3,775 tons		3,675 tons	
TIN				
Cash	£730	£730½	£730	£730½
Three months ..	£733	£734	£731	£731½
Settlement ..	£730½		£730½	
Week's turnover	1,220 tons		1,160 tons	
ZINC				
Current ½ month	£64	£64½	£63½	£64
Three months ..	£64½	£64½	£63½	£64
Week's turnover	4,600 tons		4,450 tons	

COPPER • TIN • LEAD • ZINC

(From Our London Metal Exchange Correspondent)

Over the week there has been little material alteration in the quotations for the four metals, although the copper market has fluctuated considerably. The general feeling is that although the copper and tin prices may appreciate, those of lead and zinc may go slightly lower.

U.S. COPPER FIRMER ON WHAT ?

The copper market has been very active and its behaviour has suggested that those who say that the bottom has been reached are correct, as after reaching a level of over £179 per ton for forward metal—the highest price since the first days of the year—the subsequent reaction which touched £174 was quickly stemmed; and, in fact, the official quotation on the day concerned was £176½.

Trading has been active, helped by demand from the Continent, this country, and operations in connection with the Commodity Exchange in New York. In the physical market, the shortage of electrolytic copper in Europe, already reported, showed signs of growing worse. During the week the Belgian producer raised its price twice, to finish up at the equivalent of approximately £180 per ton ex works or c.i.f. New York.

In America, customs smelters have been able to raise their price in two stages, from 23 c. per lb. to 24 c. per lb., and reports have it that business with consumers has been adequate; against this, however, producers' representatives report no increase in demand and that their sales are showing no increase whatsoever. For the first time since the war, the Commodity Exchange in New York has been the scene of great activity, and its turnover on two separate days reached approximately 6,000 s.tons, although reports say that the majority of purchasers are speculators, many of them having no knowledge whatsoever of the metal trade. As it is believed that the main sellers were those who have metal to deliver if

necessary, many people feel that a position of great weakness has developed, as it is being asked who will be the buyers when the present speculators wish to dispose of their holdings.

The figures issued by the British Bureau of Non-Ferrous Metal Statistics show that the U.K. consumption of copper in January amounted to 56,615 l.tons against 48,634 l.tons in December and that stocks of refined and blister copper at the end of January stood at 82,483 tons compared with 91,477 tons at the end of December. Stocks in Metal Exchange warehouses last Saturday totalled 19,411, being a decrease of just over 400 tons from the figure of the preceding week.

TIN A PREY TO RUMOUR

The tin market has remained based on the floor price of the International Tin Scheme and the buffer stock manager has had to absorb a small tonnage of metal during the week. The forward quotation still shows a slight contango, but demand is very disappointing and a number of rumours have been circulating which have done nothing to improve the undertone.

First, it was rumoured that the meeting fixed for April 29 was to be brought forward, but it is understood that there is absolutely no foundation for this report. Second, it has become known that at least one of the participants in the scheme is likely to appeal for an upward revision of their quota. But in this instance a number of people feel that this is only a normal occurrence before any meeting at which redistribution of quotas is likely to take place, and it seems very improbable that any alteration in the overall quota will be made to that already announced. Third, reports have been current that an application has been made to the Committee of the L.M.E. for the registration of tin produced in

Mining Finance

Anglo American's Higher Profits

It can be confidently guessed that two factors account for the rise in profits announced by Anglo American Corp. this week: one positive, one negative.

The positive factor is, of course, the rising income that Anglo must now be receiving from its interests in the expanding goldfields of South Africa. This element should not be over-emphasized in relation to this year's accounts, however, since the increase in revenue from this source may well have been cancelled out, to some extent at any rate, by declining revenue from Anglo's base-metal interests. Nevertheless, it seems not unlikely that it has been policy for Anglo American to extend its direct holdings in young mines during the past year, a surmise partly confirmed by Anglo's takeover of African and European last October.

The negative factor, which may well prove to have been the operative one when the full accounts are published, is the probable elimination of share value write-offs in 1957. In 1956 this item absorbed £450,000 of Anglo's profits—a not inconsiderable sum even in relation to an organization as large as this corporation. It is true that 1957 did not see an actual upturn of any duration in Kaffir share values, but it is equally apparent that the difference in value of the end-1956 and end-1957 portfolios will not be marked, even allowing for the fall in copper shares. Closely linked to this is the situation with regard to share-dealing profit. In 1956 there were practically no opportunities for profitable operations, while 1957, although by no means a bull year, provided at least a few occasions for share realizations.

The salient figures in the preliminary statement were that profits after tax totalled £4,987,000, against £4,418,395 in 1956, and that the final dividend of 6s. brought the total distribution for the year up to 8s. per 10s. share, against a total of 7s. per share in 1956.

TWO NEW GOLD ISSUES

The market has received two reminders this week that the time for finding new capital for the exploitation of the new goldfields is not yet past.

The first of these was an intimation from New Consolidated Gold Fields that F.S. Saaiplaas, a developing mine in the southern part of the O.F.S. goldfield, needed fresh funds. This was not unexpected as it was apparent as far back as last October that new funds would be needed comparatively soon, cash resources having declined by £2,000,000 in the year ended June last. Over and above this, the prospectus had indicated that the cost of attaining an initial milling rate of 50,000 tons monthly would be something like £12,000,000, and so far the mine has only raised a little over half of this. The foreshadowed issue of £4,854,046 bridges the gap, but no more, and the only surprising aspect is that the company did not come to the market earlier.

The most interesting point about the

preliminary issue notice is, perhaps, the preamble, wherein is implied the intention of bringing Saaiplaas to production earlier than 1961, the originally planned date. Should this happen, Saaiplaas shares may be cheap at their present price of around 11s., especially in view of the fact that the two shafts now being sunk are not only in the richest part of the lease area (boreholes ranged up to 2,154 in. dwt.) but in what is considered by some to be among the richest areas in the O.F.S. This could mean a rapid expansion in profits when production commences, which in turn might obviate the need for external financing of mill expansion and of exploitation of the northern part of the lease area.

The other issue, which has already been placed privately, is of £2,000,000 of unsecured notes by Union Corporation "to provide additional finance for its business (including the further exploitation of the Kinross goldfield)". This would imply that another Bethal flotation is on the stocks, and in this connection it is well worth remembering that New Union Goldfields and certain of its subsidiaries have quite substantial land holdings around and adjacent to the promising Winkelhaak mine.

JOHNNIES' 1957 REPORTS

Very little in the way of news is revealed by the annual reports of the gold-mining companies of the Johannesburg Consolidated Investment Group.

The report from Freddie's Consolidated is notable for the fact that this ill-starred mine has at last managed to make an overall profit for a year—the loss of £266,147 in 1956 being replaced by earnings of £120,819. In order to maintain this rate of profit both development and stoping are to be stepped up to compensate for the fractionally lower grade being mined in the current year. Sorting is now running at about 30 per cent, with beneficial results on the grade of slimes treated for uranium oxide. Of no more than academic interest is the news that Freddie's estimated loss for tax purposes at the year-end was £21,030,000.

At Randfontein, the situation is unchanged. There is an ample tonnage of known ore to ensure continuity of milling at the uranium plant until the end of the contract period in 1964, but costs will remain on the high side due to narrow stoping widths and a high rate of sorting. Overall profit at Randfontein in 1957 was £1,621,876, against £1,857,828. E. Champ d'Or, on the other hand, seems likely to exhaust its payable Bird Reef ore before the expiry of the contract period, in which case the excess capacity at the joint plant, amounting to some 11,000 tons monthly, will presumably be allocated to Randfontein.

At Government G.M.A., gold mining has virtually ceased, and operations, apart from the working of the pyrite plant, are confined to clean-ups, the treatment of old residues, and the mining of remnants. One return of capital has already received shareholders' approval,

and another, of 6d. per share like the first, is proposed. Witwatersrand Gold Mining ("Knight's") and New State Areas, the two mines in the Johnnies Group at which mining has now ceased altogether, are also planning further repayments of capital, similarly of 6d. per share. Regarding the "Knight's" proposal, the report states that it will take a considerable number of years to turn the remaining assets to account.

AFRICAN AND EUROPEAN EARN AND PAY MORE

Preliminary results issued by African and European Investment Co. this week disclose a quite remarkable advance in profits. In 1955 net profit after tax was £820,476; in 1956, £906,733; and in 1957, £1,305,643.

The bulk of this rise in earnings must be attributable to increased income from the gold mines. The African and European portfolio embraces a wide range of activity, but it has always been assumed that the emphasis was in this direction, and this thesis now seems to be confirmed. Another factor of importance may well have been a revival in share dealing profits which were extremely low in 1956 as a result of the depressed markets.

African and European is declaring a final dividend of 3s. which, with the 1s. interim paid last year, compares with a single payment of 3s. 3d. for 1956.

S.W.A. CO. PROFITS SLUMP

Due to an extremely heavy charge for depreciation, untaxed profits of the South West Africa Co. amounted to only £2,465 in the year ended June 30 last, compared with £173,569 in the preceding twelve months. The increased depreciation charge is in turn attributable to the amount written off mines and shafts, which rose to £123,000, £73,000 higher than in 1956. This, a footnote to the accounts states, was due to a reappraisal of the operating lives of the mines—a result, presumably, arising from the takeover by the Gold Fields-headed consortium last April and the subsequent appointment of that company as consulting engineers.

Otherwise, the long-term picture presented by the accounts is quite encouraging. On taking over, Gold Fields recommended a programme of intensive exploration, geological mapping and diamond drilling extending over about 2½ years. This work has now been started, although for news of its progress the mid-April chairman's statement must be awaited. Exploration during the period covered by the report was largely preparatory, and no results of any importance were obtained.

On the production side a change of emphasis is discernible. In 1956, by far the largest item of revenue was the £966,580 received from the sale of 6,411 tons of lead vanadates. In 1957, lead vanadates still accounted for the lion's

share of the revenue, but by a much smaller margin, while zinc sulphides, a minor item in the 1956 accounts brought in £206,834 from the sale of 9,162 tons, easily the largest single tonnage of mineral produced. Sales of lead sulphides followed the same upward trend. This is the direct result of the opening of the new lead-zinc plant at Abenab West in April, 1956, where lead vanadate production has almost ceased. Production of this latter mineral is now centred upon Berg Aukas which, at present, is a much smaller affair altogether, with a production in 1957 of 816 tons.

Another mineral of increasing importance to the S.W.A. Co. is tin, with its associated wolfram. The Brandenburg West opencast mine with reserves of over 800,000 tons, is being exploited at an increasing rate, and revenue from this source in 1957 amounted to £264,530, an increase from £171,250 in 1956.

ALUMINIUM UNDER PRESSURE

Aluminium, as with other base metals, was under pressure in 1957. In spite of steadily increasing consumption in the United Kingdom and in Europe, this was more than offset by the sharp decline in consumption in the United States, to-

gether with a running down of inventories.

The overall picture was thus the all too familiar one of declining demand (in this case by about 3 per cent) coupled with an effective increase in supply. Moreover, Aluminium Ltd. had the misfortune to be confronted by a four-month strike at the Arvida, Quebec, smelter of its subsidiary, Aluminum Co. of Canada. By the time the strike was settled market conditions for aluminium were so unfavourable that full reopening was deferred indefinitely, and the change in the tempo of production resulted in the twin boogies of low efficiency and high cost.

The 1957 financial results of Aluminium Ltd., measured by these standards, are not at all bad. Net income was \$41,422,456 (\$1.37 per share on the increased capital) against \$55,657,372 (equivalent to \$1.85 on the present capital), out of which dividends totalling 87½ c. were paid in 1957 against the equivalent of 78½ c. the previous year.

With regard to the future, Mr. Nathaniel Davies, the president of Aluminium Ltd., has revealed quite substantial alterations in the company's expansion plans. The total effect of the readjustment is to defer completion in Canada of about 240,000 tons of primary smelt-

ing capacity—most of which has been suspended in a state which will allow comparatively speedy completion once the green light is given—and thus to reduce Aluminium Ltd.'s capital commitments by about \$200,000,000 over the years 1957 to 1959. Outside Canada, however, expansion is going ahead at an increasing rate.

Aaglo-Vaal E.G.M.—Anglo-Transvaal Consolidated Investment Co. will hold an E.G.M. on April 11 to adopt new articles and amend the memorandum of association.

Trepca and Mr. Pasic.—The liquidator of Trepca Mines has now received a fresh proof of debt from Mr. Pasic couched in different terms from earlier proofs, the rejection of which was upheld by the company court. The present proof will be formally rejected, and should this rejection not be set aside, application will be made to the High Court for permission to distribute Trepca's assets without reference to the Pasic claim. The liquidator also reveals that the cash portion of the distribution will now amount to about 4s. 2d. (compared with the original estimate of 3s. 11d.), due to the receipt from the Foreign Compensation Commission of £140,213 as a final payment—this is £17,000 more than was expected.

LONDON MARKET HIGHLIGHTS

Copper shares emerged from their indecisive trend and jumped into prominence in no uncertain manner on the Stock Exchange last week. Previously, the market had seemed willing to respond to good news, rather than bad tidings, and the lowered Bank Rate was the signal that potential copper share buyers had been waiting for.

At the same time, the metal price started to move ahead here following its strength in New York. The firmness of copper on the New York Commodity Exchange was almost entirely a result of speculative buying in front of the anticipated import duties there and so, indirectly, was the corresponding rise in U.S. copper shares.

Few people here seemed to realize, or care, that if U.S. import duties are in fact imposed and result in a rise in U.S. copper prices, the London quotation would not move correspondingly. Moreover, if the U.S. price rose above 27 c. per lb., 4,500 tons per month at present going to the stockpile will be thrown on to the market. If the price rises to 28½ c. the total would be 8,500 tons a month.

As far as the London share market was concerned, the opinion was that prices had fallen far enough. The few observers who expressed doubts as to whether the rise was soundly based were easily outnumbered by those who were determined to buy at all costs. Consequently, share prices sailed merrily ahead and the remaining bears were forced to cover their sales. Nchanga for instance, bounded from 18½s. 3d. to 20½s. 6d. and a huge turnover was reported in Bancroft which advanced 2s. to 18s.; the fact that the latter mine will eventually be very heavily capitalized and still has many technical problems to overcome seemed to be ignored. More soundly based was the investment demand for Messina on their low production cost advantages; the

shares jumped 10s. to 8½s. 3d. and the options bounded 1½s. 3d. to 4½s. 6d.

Later in the week the rush of enthusiasm for copper shares waned and rather erratic conditions followed a setback in the metal price. Rhodesian issues, which had moved ahead with the general trend, but without much actual business passing, were quick to react when the market hesitated.

The immediate outlook for the share market is obscure and in the present sensitive trading conditions share prices will probably continue to fluctuate violently for a while. Potential investors should tread very cautiously especially in view of the fact that the next few weeks will see the declaration of interim dividends from Messina, Roan and R.S.T. These payments will reflect the fall in current financial years' earnings and cannot be expected to be at all encouraging. But for those who feel the metal price is unlikely to go much lower and wish to invest in copper's undoubted longer-term prosperity, the recently issued M.T.D. Mangula shares look to be the safest bet. This is because the shares at 5s. 7½d. are only slightly above their 5s. issue price, whereas the established producers look to be high priced in relation to current earnings. Further, Mangula can in its present early stages break even with copper at £160 a ton. This figure should be improved upon later when full production is reached.

There was very little doing in other mining sections. Spasmodic interest was seen in Gold shares, particularly those of the dividend payers and "break-up" stocks. Among the newer mines, St. Helena (39s. 1½d.) hardened on further talk of good developments, while F.S. Saaiplaas (1½s.) eased slightly on the long expected new issue news. Anglo American (12½s.) responded to the rather unexpectedly higher dividend.

IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY (UNIVERSITY OF LONDON) POST-GRADUATE COURSE IN MINING AT THE ROYAL SCHOOL OF MINES

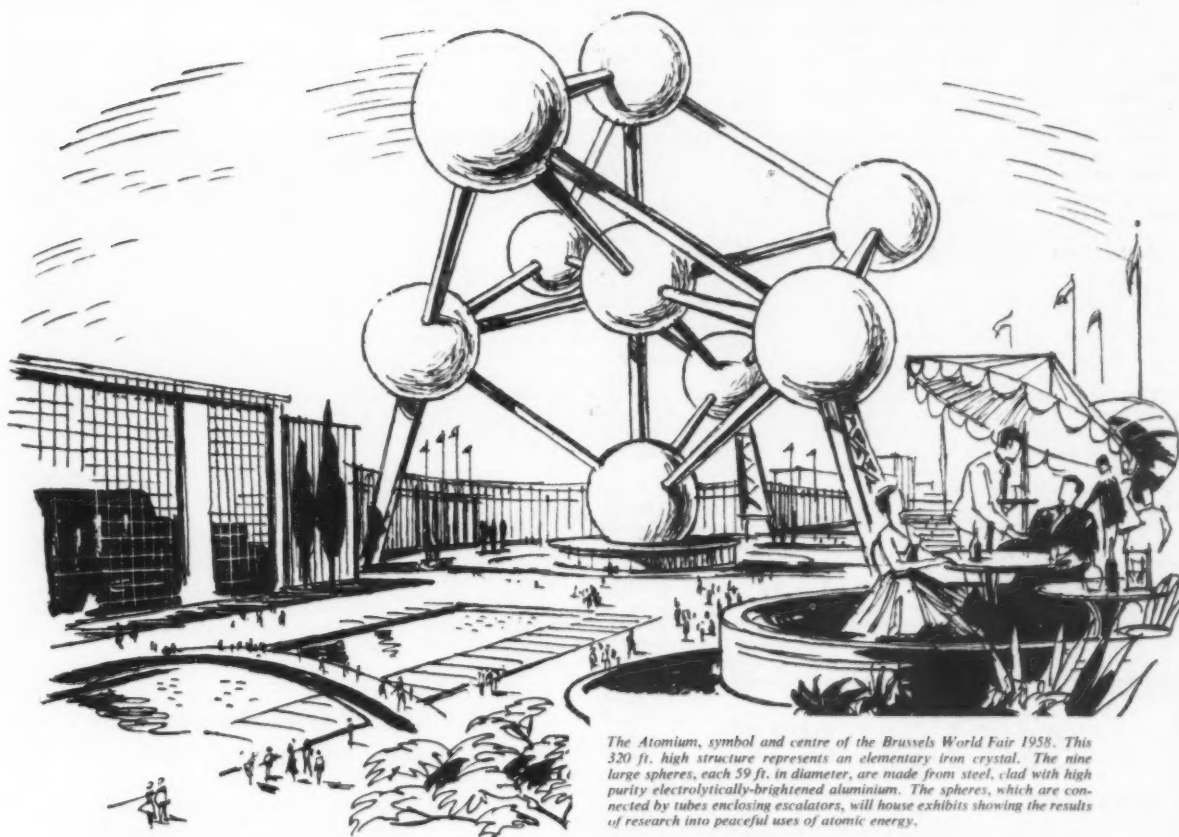
This course will be held again in the academic year starting in October, 1958. It is primarily for metalliferous mining engineers, with several years' practical experience, who desire to broaden their knowledge of mine administration and operation. For admission an appropriate degree is normally required, but alternative qualifications will be considered. Successful students will be awarded the Diploma of the Imperial College (D.I.C.)

The course, of which certain portions will be taken at the London School of Economics, will consist of lectures and seminars. Facilities are provided for the study of Industrial and Business Administration, Mine Economics, Mine Appraisal and Reporting, together with ancillary subjects. Visits to mines and engineering works will be arranged, and one Atlas Copco Travel Scholarship to Sweden is reserved for a member of the course. The Department of Scientific and Industrial Research has accepted the course for the tenure of its Advanced Course Studentships.

The fee for the course is £64.

Applications for admission to the course should be made, preferably not later than July 1, 1958, on a form obtainable from the Registrar, Imperial College, London, S.W.7, from whom further particulars are available.

More than 1,000 Tons of Aluminium at the Brussels World Fair



The Atomium, symbol and centre of the Brussels World Fair 1958. This 320 ft. high structure represents an elementary iron crystal. The nine large spheres, each 59 ft. in diameter, are made from steel, clad with high purity electrolytically-brightened aluminium. The spheres, which are connected by tubes enclosing escalators, will house exhibits showing the results of research into peaceful uses of atomic energy.

Aluminium is once again proving itself to be the Metal of the Age in this era of scientific adventure. Architects and designers of many nations are using this strong, light, corrosion-resistant metal with imagination and ingenuity at the Brussels World Fair in the national pavilions and exhibition halls. Here are just a few examples:

CANADIAN PAVILION

Aluminium span windows, stairway and external doors.

BRITISH PAVILION

30 tons of NORAL aluminium used for the roof.

AMERICAN PAVILION

Aluminium extrusions used to support transparent plastic roof.

RUSSIAN PAVILION

340 tons of aluminium sheet and extrusions used in the roof.

SPANISH PAVILION

Aluminium window frames.

TURKISH PAVILION

Aluminium roof.

PALAIS DES TRANSPORT

150 tons of aluminium used in the roof structure.

PALAIS II

About 70 tons of aluminium used for the anodised facade.

PALAIS DE L'ELECTRICITE

An aluminium facade.

ROAD TRANSPORT VIADUCT

2,600 ft. viaduct will incorporate a decorative aluminium balustrade.



If you are visiting the Fair make a point of seeing the Kitimat-Kemano and Aluminium Exhibits at the Canadian Pavilion

Aluminium Union Limited

(Incorporated in Canada)



The Seventh Electrical Engineers (A.S.E.E.) Exhibition

The Seventh Electrical Engineers (A.S.E.E.) Exhibition is being held from March 25-29 at Earls Court. Several of the exhibitors are displaying equipment that is of particular interest to the mining industry.

The principal exhibits of *Metropolitan-Vickers Electrical Co. Ltd.*, include a range of small motors, including a 10-h.p. type KN-C ventilated squirrel-cage motor, a 2-h.p. type KN-B totally-enclosed fan-cooled motor, and a flameproof induction motor, one of a range which has been modified to give greatly increased outputs.

A 330-kV. single-phase assembly and control kiosk of a type GA 11W8 air-break circuit-breaker is shown, the highest-voltage circuit-breaker ever to be built in this country.

Other equipments include a three-panel type CMC switchboard, a display of instruments and meters and Magistor photo-transistor relays.

The accumulated results of many years' research and experience in manufacturing fractional h.p. motors for industrial application are found in the new range of motors shown on the *Crompton Parkinson* stand. This new range of motors—the series "T"—are more streamlined and compact than previous models and incorporate several improvements to design.

Symmetrical ventilation by means of twin fans which draw in air around the bearings and dispel it through holes in the lower part of the shell, cause the

temperature rise of many ratings to be well below the permitted maximum.

The *Rawlplug Co.* have introduced an entirely new electric drilling machine. This is shown for the first time at the exhibition. This machine has been designed to combine an intense rate of vibratory action with fast rotary movement for the drilling of holes in all classes of concrete—the special feature being a rapid rate of penetration through a pebble aggregate.

The wide range of equipment made by BTH, including motors, control gear, switchgear, germanium rectifiers and electronic apparatus is represented on the *British Thomson-Houston* stand.

Exhibits of electric motors include the BTH type KNC with Class E insulation—built to draft British Standard Dimensions for ventilated motors; a "Stayrite" single-phase power drive comprising an extremely robust motor with push-button contractor-type starter; sectional models of various types of industrial motors; and several new models of fractional horsepower motors demonstrating the efficient design of the components.

Among the industrial control gear is an exhibit which demonstrates how the well-known type DOC 71 push-button starter can be built into a compact motor control panel incorporating ammeter, HRC fuses, and isolator.

A particularly interesting exhibit is the new BTH capacitor D.C. braking equipment. Switchgear exhibits include

the moving (oil circuit-breaker) portion of a Class QF11 metal-clad vertical-plugging switchgear equipment which can be supplied for a rating of 1,000 MVA at 13.2 kV., and the BTH 3-phase automatic circuit recloser for the protection of rural transmission lines up to 11 kV.

The section on electronics features a working demonstration of BTH Emotrol (electronic motor control), an infra-red pyrometer for the remote reading of black-heat temperatures, electronic timers, and examples from the extensive range of photo-electric equipment. An application of germanium power rectifier cells is shown in a rectifier cubicle designed for a D.C. output of 250kW. (240 volts, 1,040 amperes).

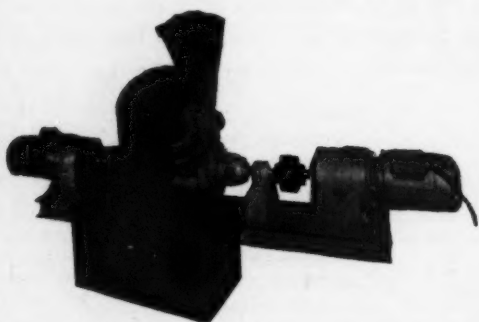
A number of new products are on view for the first time on the stand of *Igranic Electric Co. Ltd.* These will include a range of heavy duty oil-tight control units, block-type contactors, static relays and a demonstration magnetic amplifier drive. There is also exhibited a selection from the company's range of standard starters, auxiliary switches, brakes and solenoids. Also a mimic flow diagram panel.

The heavy duty oil-tight control unit range comprises push-buttons, selector switches and indicating lights. The new range of block-type construction contactors covers 10, 20, 30 and 50 capacity.

The new Igranic-type static control gear is claimed to offer many advantages over electro-magnetic control relays.

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West African Gold Production for October—December, 1957

Company	Oct.-Dec. 1957			Months since year end	Current Financial Year Total to date			Last Financial Year Total to date		
	Tons (000)	Yield (oz.)	Profit (£000)		Tons (000)	Yield (oz.)	Profit (£000)	Tons (000)	Yield (oz.)	Profit (£000)
Amal Bantek	188.3	41,441	108.0	3	188.3	41,441	108.0	176.3	36,826	93.5
Ariston	123.1	38,565	151.3	3	123.1	38,565	151.3	119.1	34,732	138.6
Ashanti	82.4	62,309	317.9	3	82.4	62,309	317.9	82.4	62,309	443.1
Bibiani (1927)	90.0	19,500	22.7	3	90.0	19,500	22.7	90.0	19,500	80.9
Bremang*	248.2	12,333	47.4	12	813.0	41,505	144.0	845.4	43,177	156.2
Ghana M.R.	33.1	12,128	38.9	6	69.3	24,164	79.7	72.4	22,119	63.7
Konongo	15.3	11,770	45.3	3	15.3	11,770	45.3	13.7	11,884	50.0

* Cu. yds. dredged.

South African and Rhodesian Coal Output for October—December, 1957

Company	3 months to Dec. 31 (in tons)	Months since year end	Cumulative Totals (in tons)	
			This year to date	Last year to date
Amal. Coll. of S.A.	1,584,974	12	6,407,759	6,396,728
Apex	193,511	12	872,043	874,005
Blesbok	155,608	12	622,449	617,636
Coronation	311,084	12	1,207,589	1,108,828
Natal Navigation	321,394	6	633,606	556,136
New Clydesdale	307,519	6	389,306	475,274
New Largo	303,439	12	1,221,692	1,387,518
S.A. Coal Estates	405,120	6	839,327	822,205
Springbok	277,992	12	974,509	875,758
Transvaal & Delagoa	358,053	4	477,624	470,258
Van Dyks Drift	186,998	12	674,866	686,254
Vierfontein	284,686	12	1,370,057	1,480,236
Vryheid Cor	158,210	12	636,475	616,549
Vryheid Cor*	123,228	12	491,974	502,964
Wankie	1,031,284	4	1,344,312	1,271,133
Wankie*	62,158	4	84,312	83,907
Witbank	389,350	12	1,685,570	2,737,044

* Coke

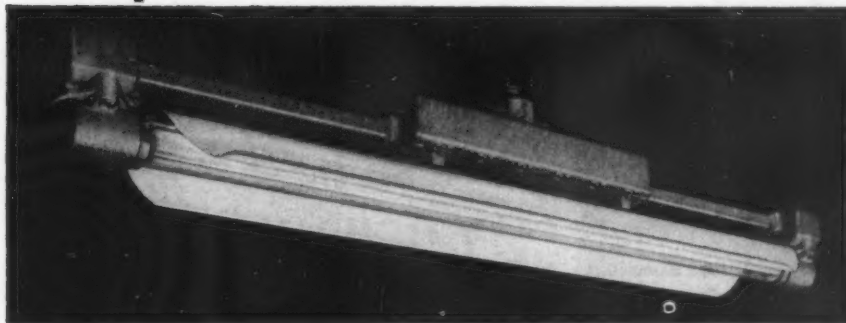
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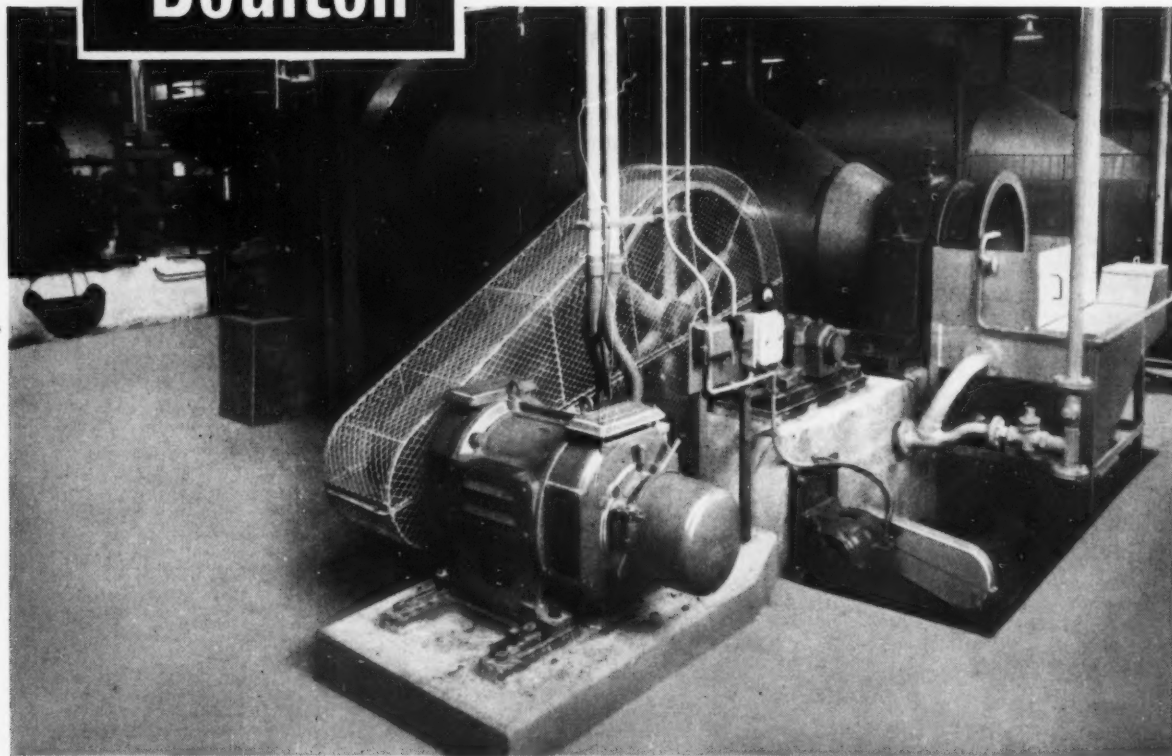
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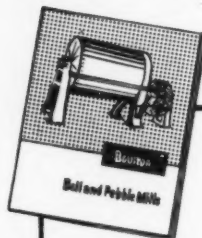
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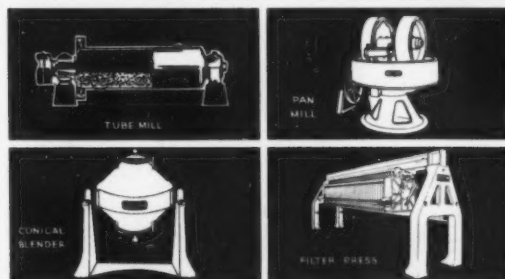


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